MONTANA FISH, WILDLIFE & PARKS
DRAFT FOREST MANAGEMENT PLAN

Montana Fish, Wildlife & Parks

August 2017

MONTANA FISH, WILDLIFE & PARKS DRAFT FOREST MANAGEMENT PLAN

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August 2017

PLAN APPROVAL:

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LIST OF ACRONYMS AND ABBREVIATIONS USED

AFLF - Affiliated Lands/Fisheries

AFLP - Affiliated Lands/Parks

AFLW - Affiliated Land/Wildlife

ARM - Administrative Rules of Montana

BA - Basal area

BMP - Forestry Best Management Practices

Board - State Parks Board

BP - Brood Pond

BPA - Bonneville Power Administration

Commission - Fish and Wildlife Commission

CWD - Coarse Woody Debris

CWPP - Community Wildfire Protection Plan

DFC - Desired Future Condition

DNRC - Montana Department of Natural Resources and Conservation

DOR - Montana Department of Revenue

ESA - Endangered Species Act

FAS - Fishing Access Site

FCA - Fisheries Conservation Area

FRCC - Fire Regime Condition Class

FRV - Future Range of Variation

FT - Fish Trap

FWP - Montana Fish, Wildlife & Parks

GIS - Geographic Information System

HRV - Historic Range of Variation

HTC - Hatchery

HUC - Hydrologic Unit Code

MBF - Thousand Board Feet

MCA - Montana Code Annotated

MNHP - Montana Natural Heritage Program

MSDI - Montana Spatial Data Infrastructure

PCT - Precommercial Thin

§ - Section

SAF - Society of American Foresters

SAFR - Statewide Assessment of Forest Resources

SAWG - Statewide Assessment Working Group

SCLASS - Succession Class

SGCN - Species of Greatest Conservation Need

SHPO - State Historic Preservation Office

SP - State Park

SWAP - State Wildlife Action Plan

U.S.C. - United States Code

USFS - United States Forest Service

VCC - Vegetation Condition Class

VDEP - Vegetation Departure

Vmap - USFS Vegetation Mapping Program

WHPA - Wildlife Habitat Protection Area

WMA - Wildlife Management Area

WUI - Wildland Urban Interface

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FOREWORD

Montana Fish, Wildlife and Parks is responsible to the public for ensuring sustainable populations of fish and wildlife and associated recreation and for providing a vibrant state park system. That undertaking encompasses a broad array of natural resource values which are of great public interest at even national and international scales. Our management decisions directly influence these values, associated ecological functions, and day to day opportunities of many outdoor enthusiasts.

As Montanans, we have a unique heritage that is strongly influenced by the outdoors, nature, and conservation. We particularly enjoy a history of conservation that has included acquiring interests in land for the benefit of fish, wildlife, and many peoples for generations to come. These lands are managed as parks, they are dedicated to fish and wildlife habitat and compatible recreation, and they provide access for angling and other water-based recreation. Managing these lands to assure their natural values are retained while also being a good neighbor with adjoining landowners is a fundamental objective for all FWP lands. The pages which follow are intended to provide guidance for how FWP manages its forested lands within a statutory framework, recognizing the ecological, recreational, and social values that are inherent to individual properties and that are integrated parts of much larger landscapes.

Montana Fish, Wildlife and Parks is fortunate to have a full-time Forester on staff. Jason Parke, the primary author of this document and the Department's first staff forester, received his formal education in forestry at the University of Montana and spent subsequent years working as a professional forester for private industry in the Pacific Northwest and then for Montana DNRC. In addition to the primary author, this document is a culmination of efforts by department staff from the Parks, Fisheries, and Wildlife Divisions.

Rick Northrup
Wildlife Habitat Bureau Chief

EXECUTIVE SUMMARY

Introduction

Montana Fish, Wildlife and Parks (FWP) has prepared a Forest Management Plan for forested land administered by its Fisheries, Wildlife, and Parks Divisions. Almost 200,000 acres (see Table ES-1) of forested lands are distributed amongst a variety of sites including Montana's Fishing Access Sites (FAS), Fisheries Conservation Areas (FCA), Wildlife Management Areas (WMA), Wildlife Habitat Protection Areas (WHPA), and State Parks (SP). These lands, as with all public lands of the state, are held in trust for the people and for the purposes provided by law. Accordingly, FWP has the duty of administering these lands and it is FWP's mission to "provide for the stewardship of the fish, wildlife, parks and recreational resources of Montana, while contributing to the quality of life for present and future generations" on these lands.

In this Forest Management Plan, FWP has adopted a forest management philosophy that maintaining "ecological integrity" of forests will ensure this mission can be achieved over the long-term. This philosophy is based on the premise that maintaining ecological integrity will produce a healthy, functioning forest ecosystem able to sustain native species, populations, and genetic diversity as well as sustaining the recreational uses and ecosystem services desired from these lands. This plan establishes guidance and direction on how each FWP Division can develop forest management plans and projects to provide these desired uses and ecosystem services (i.e. public access to high-quality waters, effective fish and wildlife habitat, and preservation of and access to valuable public resources) while maintaining the ecological integrity of these forested lands.

Ecological integrity is the ability of an area to support biodiversity and the ecosystem processes necessary to sustain biodiversity over the long term.

Purpose, Need and Scope

This is a programmatic plan designed to provide consistent management direction and guidance for developing property-specific forest management plans, implementing forest management projects, and identifying forest management priorities. In § 87-1-622(1), Montana Code Annotated (MCA), the legislature has directed the Fish and Wildlife Commission (Commission) and State Parks Board (Board) to adopt forest management plans for lands under their jurisdiction. This plan applies to all forested land under fee-title ownership administered by FWP. It does not, however, identify site-specific projects or set harvest volume targets.

Table ES 1 - FWP Forested Sites and Acres

Division	# of Forested Sites	Forested Acres
Fisheries	91	3,119
Wildlife	49	182,362
State Parks	30	14,277
Total	**170**	**199,758**

Forest Management Approach

Each FWP Division has a unique mission and therefore values the forest for somewhat distinct roles and contributions to their mission. The FAS program's mission is to provide permanent public access to high-quality rivers, streams, and lakes. The mission of WMAs is to provide effective wildlife habitat and compatible recreational opportunities. The SP mission is to preserve and protect our state's cultural, natural, and recreation heritage for the benefit of our families, communities, and local economies. Within these missions there is also significant overlap, although the priority of one resource (e.g. wildlife habitat) may be higher or lower, depending on the site type.

FWP has adopted the forest management philosophy that maintaining ecological integrity will ensure that forests can sustain the uses and ecosystem services desired on all FWP properties. In order to maintain ecological integrity, FWP has adopted the "filter" approach. The premise of the three filters—the coarse filter, mesofilter, and fine filter—is to conserve biodiversity, thereby sustaining forests and all that they provide. FWP has also identified Special Management Areas, to address site-specific issues such as public safety or fire hazard in the Wildland Urban Interface.

The first filter, called the coarse filter, considers the vegetation community and how the historic (and natural) variability of ecological processes (i.e. succession and disturbance) interact with species in the ecosystem. Ecological processes, including disturbances such as wildfire and mountain pine beetle infestation, interact with forests on a landscape scale and the coarse filter approach would consider how forests on FWP properties fit within these landscapes. Geographic location, topography, and climate are some of the key factors influencing how ecological processes affect the development of vegetation communities. FWP would consider how historical disturbance regimes produce plant community compositions and structures and use management that attempts to allow and emulate these processes within their historic (and natural) range of variability.

The second filter, the mesofilter, focuses on key habitat elements within various ecological settings. An ecological setting refers to a grouping of wildlife habitats that support similar functions and therefore may have common management objectives. Key habitat elements are features or structures of forests within these ecological settings, such as snags or thermal cover, that are important for providing effective habitat for certain wildlife species. FWP would identify the key habitat elements within these ecological settings and use management that would enhance and/or maintain appropriate levels of these elements.

The third filter, the fine filter, focuses on individual priority species and their habitats. Some species depend on specific habitat conditions or elements within forests. FWP would identify priority species and determine if their habitat needs are met through the coarse and/or fine filter approach and, if not, use management that would enhance or protect habitat elements that are critical to sustaining viable populations of these priority species. An example of this approach would be restoring whitebark pine in upper elevation forests for Clark's nutcracker, a specialized species that relies on the seeds of whitebark pine for food.

These three filters would be used to identify potential desired future conditions (DFC) for FWP properties. However, there are instances where other issues or values are either not addressed by the filter approach or potentially in conflict with this approach. An example of this is where natural disturbances, such as a mountain pine beetle infestation, threaten aesthetics or public safety within an area intensively used by the public. For these site-specific concerns, FWP has identified a number of Special Management Areas, where alternative DFCs would be developed.

Implementation

FWP would use the filter approach as well as Special Management Areas to analyze and evaluate forest conditions and managers would use this information to develop DFCs. FWP would conduct these analyses at the property-specific and/or project level, identify and prioritize DFCs, determine management actions that could be used to achieve DFCs (including passive management), develop silvicultural prescriptions, implement management actions using appropriate tools for achieving DFCs (such as artificial regeneration or timber harvest), and identify monitoring activities for tracking progress towards DFCs. FWP would pursue cooperative planning and management with other agencies and organizations to increase the efficiency and effectiveness of meeting FWP's forest management objectives.

In accordance with the provisions of § 87-1-621, MCA, a special revenue account called the Forest Management Account was created and FWP would deposit funds from timber sales in this account to pay for and implement the forest management program. Also, § 87-1-622, MCA required FWP to conduct a sustained yield study on the amount of timber that could be harvested annually from FWP forested lands and adopt plans based on an annual sustained yield. In order for the forest management program to be financially viable, timber sales would be considered as a management tool to meet FWPs objectives for its forested lands.

Priorities and Next Steps

FWP would develop two-year and five-year project lists and estimated budgets to prioritize project implementation. FWP would pursue alternative funding sources, such as grant funding, to increase the capacity of accomplishing high-priority, non-revenue generating projects. In order to implement the forest management program, FWP would use its own staff, cooperative agreements with other state and federal agencies, volunteers, and contracted services. FWP is developing a forest inventory database and would develop a system (such as a Geographic Information System tool and/or computer software) for consistently conducting analysis, evaluating forest conditions, and monitoring. FWP would ultimately rely on the expertise of its managers to prioritize needs, develop plans, and propose projects for implementation.

To help determine the highest priority areas for planning and project development across almost 200,000 acres of forested land distributed amongst 170 sites, FWP managers would use a decision matrix incorporating previously established modeling efforts that have identified habitat and forest management priorities across the state as well as other pertinent criteria developed by FWP managers.

1. INTRODUCTION

1.1 Mission of FWP

Montana Fish, Wildlife & Parks, through its employees and citizen commission, provides for the stewardship of the fish, wildlife, parks and recreational resources of Montana, while contributing to the quality of life for present and future generations.

1.2 FWP's Vision

Montana is a place where people have abundant opportunities to connect with the world-renowned fish, wildlife, and state parks resources that define our state, and where a responsive and relevant FWP has the resiliency and public support it needs to lead the way in making sure these resources remain an essential part of Montana's culture, economy, and high quality of life.

1.3 FWP's Core Values

These eight values guide all of us in how we do business every day—with the public we serve, with the resources we manage, and in the capacity for effective management we build together:

1. Serve the public – We strive to meet public expectations for fish, wildlife, and state parks resource conservation, access, opportunity, services, fiscal responsibility, and involvement in transparent decision-making processes.
2. Embrace the public trust – We recognize that Montana's fish and wildlife are the public's resources and are held in trust by the state to be managed for the benefit of present and future generations. The opportunity to enjoy and harvest these resources is allocated equitably.
3. Honor tradition and heritage – We value the continued importance of hunting, fishing, trapping, and other outdoor recreation to Montana's culture and conservation ethic. We honor the cultures of native peoples and value Montana's vibrant history.
4. Work with landowners – We respect property rights and work collaboratively with landowners to manage fish, wildlife, and state parks resources and the public's opportunity to enjoy them.
5. Use science – We use the best biological and social sciences to inform and make management decisions.
6. Provide leadership – We provide expertise and direction in fish, wildlife, and state parks outdoor recreation, resource management, and conservation to enhance Montana's outdoor heritage, economic future, and quality of life.
7. Provide stewardship – We manage for healthy and abundant fish and wildlife populations, improve and protect habitat, and protect and restore cultural and historical resources.
8. Value our workforce – We are all Montana Fish, Wildlife & Parks. We operate as one agency, which values and supports all employees. All employees work as a team; value, respect, and support each other; and exemplify high standards of ethics, professionalism, objectivity, accountability, and integrity.

1.4 Purpose, Need, and Scope of the Plan

The purpose of this forest management plan is to provide consistent management direction for all forested land administered by Montana Fish, Wildlife and Parks (FWP). It fulfills the obligation required by law in § 87-1-622(1), MCA (Montana Code Annotated), stating: "*the commission and the board shall adopt forest management plans for lands under their jurisdiction, based on an annual sustained yield, to implement provisions of 87-1-201(9)(a)(iv).*" This plan provides managers with guidance on how to implement the provisions of § 87-1-201(9)(a)(iv), MCA which states that "*The department shall implement programs that: in accordance with the forest management plan required by 87-1-622, address fire mitigation, pine beetle infestation, and wildlife habitat enhancement giving priority to forested lands in excess of 50 contiguous acres in any state park, fishing access site, or wildlife management area under the department's jurisdiction.*" Furthermore, this plan provides managers with guidance about how existing objectives for FWP forested properties can be achieved through forest management.

This is a programmatic plan; it is designed to provide a framework for developing property-specific forest management plans and guidelines for implementing forest management projects. This plan defines a forest management approach to be used by managers to evaluate current conditions, develop desired future conditions (DFC), determine actions that can be implemented to achieve DFCs, and monitoring that will be done to track progress towards achieving DFCs.

Montana's forests are diverse and uniquely different from one corner of the state to the other. Each individual property and forest exists within a unique geographic location, ecological setting, and FWP Division (Wildlife, Fisheries, or State Parks). Each property supports, and is valued for, a wide variety of biotic and abiotic components. Ecological integrity–the ability of an area to support biodiversity and the ecosystem processes necessary to sustain biodiversity over the long term (McGarigal et al. 2011)–is a common thread guiding management of all these forest lands, but the diversity of species and human-held values of the land varies widely from property to property. This plan does not identify site-specific projects, set harvest volume targets, or commit future allocation of individual resources. Instead this plan should be used by managers as a framework for developing forest management priorities and implementing forest treatments at the property and/or project area level.

1.5 General Applicability

This forest management plan shall apply to all forested land under fee-title ownership by the State of Montana, Department of Fish, Wildlife and Parks. This plan does not apply to FWP conservation easements on non-FWP owned land. These lands include, but are not limited to the following site types:

General & Administrative:

Headquarters, Field Offices, and Miscellaneous

Fisheries Division Properties:

Fishing Access Site (FAS), Fisheries Conservation Area (FCA), Brood Pond (BP), Fish Trap (FT), Hatchery (HTC), and Affiliated Lands/Fisheries (AFLF)

Wildlife Division Properties:

Wildlife Management Area (WMA), Wildlife Habitat Protection Area (WHPA), and Affiliated Lands/Wildlife (AFLW)

Parks Division Properties:

State Park (SP) and Affiliated Lands/Parks (AFLP)

1.6 Property Summary and History

1.6.1 Fisheries Division Properties

Beginning in 1974, funding was earmarked for the acquisition and development of FASs. A portion of the sale of each fishing license goes to the acquisition and maintenance of FASs. The program was started for the purpose of providing permanent public access to high-quality rivers, streams and lakes. The properties acquired are to be of adequate size to allow for the development of facilities as well as the practical use of the adjacent waters for fishing and, when appropriate other water-based recreation activities. Currently, there are a total of 336 FASs statewide.

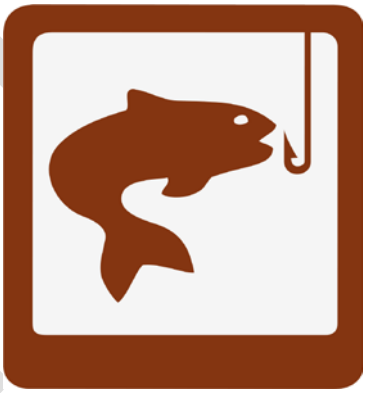


Figure 1 - Fishing Access Site highway sign. There are currently 336 Fishing Access sites in Montana.

Early in the program's conception, large tracts of land were often acquired for FASs. Many of them also included forested uplands that weren't necessarily essential to providing water-based recreation access but were part of the "acquisition package". The FAS program has a total of 86 sites encompassing 2,560 acres of forested land. These forested lands are used extensively by the public for hunting, hiking and wildlife viewing.

Development at each of the FASs typically consists of day use facilities including boat ramps, roads, parking areas, fencing, signage and vault latrines. Forested areas within FASs are often used for campsite development as they provide shade and shelter from the wind as well as the occasional afternoon summer thunderstorm.

All Fisheries Conservation Areas (FCAs) to date, occur in Region 1 and were purchased using Bonneville Power Administration (BPA) fisheries mitigation funds. BPA funds acquisition of lands or conservation easements by FWP to mitigate for the impacts to resident fish from construction and inundation of federal hydroelectric projects in northwest Montana. The purpose of this program is to preserve, create, enhance, restore, and protect the functional habitat values, especially riparian areas and wetlands. The BPA fisheries mitigation program prioritizes projects that benefit bull trout and westslope cutthroat trout, but these projects also benefit other fish and wildlife species, water quality improvement, flood water retention, groundwater recharge, open space, aesthetic values and environmental education. The

first of these acquisitions occurred in 2007 as part of a broader effort to conserve industrial forest lands within the Swan River State Forest.

1.6.2 Wildlife Division Properties

Dating back to 1940, the Montana Fish and Game Department set a course for conserving priority wildlife habitats with the original purchase of 1,000 acres, which came to be the Judith River Wildlife Management Area. Subsequent purchases over the next 47 years included many critical big game winter ranges such as the Sun River, Beartooth, and Blacktail WMAs; priority wetland habitat complexes such as the Ninepipe, Fox Lake, and Freezout WMAs; and highly productive river bottom WMAs along the Yellowstone, Milk and other eastern Montana rivers. Some WMAs purchased during that timeframe involved a mix of habitats, which included considerable forest lands such as the Mount Haggin, Blackfoot-Clearwater, and Threemile WMAs.

Figure 2 - The Judith River WMA was acquired in 1940, becoming the first WMA in Montana.

In 1987, FWP started a bold new chapter in habitat conservation with the establishment of the Habitat Montana Program through passage of House Bill 526. This new program included funding for conservation easements, fee title acquisitions, and maintenance of WMAs. Yet again in 2001, FWP was given the lead agency role for administering the U.S. Forest Service (USFS) Forest Legacy Program in Montana, furthering the opportunity to specifically conserve high priority forest lands in the state.

FWP's focus on conserving priority wildlife habitats has resulted in 441,000 acres of private lands conserved through perpetual conservation easements, acquisition of over 385,000 acres in fee title, and leasing of 72,000 acres managed as WMA lands. Of particular note, two predominantly forested WMAs, Fish Creek and Marshall Creek, were purchased by FWP as recently as 2010, comprising approximately 60,000 acres of forested wildlife habitat.

At the time of acquisition, nearly every timber property purchased by FWP had been harvested within one or two decades prior to state ownership. Part of the purchase agreement for Mount Haggin WMA in 1976 included a reserved right for the seller to complete a substantial one-time harvest of timber within a decade *after* the department acquired the land. For many forests on WMA lands, sufficient time has passed that active forest management to accomplish habitat and forest health objectives is timely, or even somewhat past due. Some recently acquired forest lands are still in early stages of regrowth, but represent substantial opportunity for habitat enhancement through various silvicultural practices.

For well over 30 years FWP has managed portions of WMA lands using traditional "working lands" techniques to achieve specific wildlife habitat objectives. This is consistent with Aldo Leopold's insightful observation, excerpted from his 1933 book *Game Management,* "game can be restored by the creative

use of the same tools which have heretofore destroyed it – axe, plow, cow, fire, and gun". On WMAs, farming has been used to establish and enhance seeded nesting cover and to provide forage crops for a variety of game species. Grazing has been used to enhance forage and provide a diversity of herbaceous structures, appealing to many target wildlife species. In similar fashion, forest treatments, including commercial harvest, has been employed as a tool to achieve specific habitat, forest health, and other land management objectives. Together, these tools also provide a means for local producers, ranchers, loggers, and mills to have a tie to these wildlife lands, broadening their value to local communities while achieving wildlife habitat conservation.

1.6.3 Parks Division Properties

Outdoor recreation is an integral part of Montana's heritage and Montana State Parks has provided recreational opportunities, and preserved and protected our state's heritage and the natural beauty of our public lands for over 75 years. Rutledge Parker, appointed Montana State Forester in 1925, was the champion and catalyst in advancing legislation to establish a state park system. In addition to his duties as State Forester, he became the first State Park Director in 1929.

Figure 3 - Montana State Parks Logo. Montana's first State Park was created in 1939.

In 1939, the legislature passed HB 80 creating the 3-person Montana State Park Commission. The Commission was a governor appointed board with powers to "conserve the scenic, historic, archeological, scientific and recreational resources of the state." That same year the first state park, Lewis and Clark Caverns, was created. The Commission took on a great deal of responsibility and new projects, but without the funds to support their ambitious goals, it dissolved in the early 1950s. State Parks were then transferred to the State Highway Commission where, under the new State Parks Division, the system continued to grow, adding some of the state's most outstanding attractions such as Bannack, Makoshika, Medicine Rocks, and sites at Flathead Lake.

The 1960s marked a turning point for Montana State Parks as well as recreation across the nation, and with the anticipation of a nationwide surge in demand for recreation and potential opportunities for federal funding sources, State Parks were transferred to the Montana Department of Fish and Game in 1965 along with a mandate to conserve and provide recreational and cultural resources. More state parks and funding sources were added in the coming years and in 1978 the agency name was officially changed to Montana Fish, Wildlife & Parks.

Today, the system has grown to over 50 state parks with sites being managed for their statewide significance in representing the scenic, historic, cultural, scientific and recreational legacy of Montana. These sites provide relevant programs and experiences that create lasting memories for Montana families and visitors, support our tourism economy and are accessible for all regardless of wealth, physical ability, or location in the state.

Over the past several years state parks have seen a notable increasing trend in public use with record breaking visitation year after year. This popularity has proven extremely challenging for park system

staff to meet increasing visitor demands with limited time and resources. Despite these challenges, the state park system continues to grow, mature and balance high quality customer service to visitors with professional stewardship of these important Montana places.

1.7 Summary of Forested FWP Properties

As of April 4, 2017, FWP owns 170 sites with forested land. The total acreage (including forested and non-forested land) of these 170 sites is 379,601 acres. There are 199,758 acres of forested land on these FWP sites. The following tables summarize all FWP owned lands with forest. The tables were derived using FWP's geographic information system (GIS) database. Forested acres were calculated by using ArcGIS to intersect FWP's GIS database with the Montana Department of Revenue's (DOR) Final Land Unit Classification GIS database. Forested acres in the following tables include both commercial and noncommercial forest, as identified by DOR. One exception to this is Makoshika SP in Region 7, which did not show up as having any forested land in the DOR database. To calculate the forested acres for Makoshika SP, the Montana Natural Heritage Program's Landcover GIS database was used.

Table 1 - Summary of All FWP Forested Land

SITE TYPE	# OF FORESTED SITES	TOTAL ACRES	FORESTED ACRES
Fishing Access Site	86	5,644	2,560
Fisheries Conservation Areas	4	953	540
Hatchery	1	20	19
Total Fisheries Division	**91**	**6,617**	**3,119**
Wildlife Management Area	44	340,099	182,192
Wildlife Habitat Protection Area	4	296	144
Affiliated Lands/Wildlife	1	41	26
Total Wildlife Division	**49**	**340,436**	**182,362**
State Park	28	32,013	13,905
Affiliated Lands/Parks	2	535	372
Total Parks Division	**30**	**32,548**	**14,277**
Total all FWP Divisions	**170**	**379,601**	**199,758**

Table 2 - Summary of Region 1 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Blanchard Lake	FAS	4.78	3.25
Glen Lake	FAS	1.74	1.51
Horseshoe Lake/Ferndale	FAS	23.55	15.30
Island Lake	FAS	37.88	28.40
Kokanee Bend	FAS	180.61	119.78
Kookoosint	FAS	2.37	0.37
Loon Lake/Eureka	FAS	0.51	0.42
Loon Lake/Ferndale	FAS	2.52	0.76

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Marl Lake	FAS	3.02	2.07
Old Steel Bridge	FAS	128.21	89.69
Paul's Memorial	FAS	10.00	9.84
Pressentine	FAS	10.70	0.93
Shady Lane Fishing Pond	FAS	4.64	0.04
Sophie Lake	FAS	19.75	17.52
Swan River	FAS	58.47	58.07
Tetrault Lake	FAS	7.86	1.97
Walstad Memorial	FAS	1.11	0.94
Woods Bay	FAS	11.62	10.77
Total Fishing Access Sites	**18**	**509**	**362**
Foys Bend	FCA	243.46	47.03
Hay Creek	FCA	54.65	17.76
North Swan Valley	FCA	490.88	423.42
Otter Island	FCA	164.24	51.83
Total Fisheries Conservation Area Sites	**4**	**953**	**540**
Flathead Lake Salmon Hatchery	HTC	19.89	18.72
Total Hatchery Sites	**1**	**20**	**19**
Bighorn Viewing Site	WMA	49.48	1.99
Bull River	WMA	1,576.06	1,287.66
Full Curl	WMA	290.67	31.68
Kootenai - Falls	WMA	171.92	109.79
Kootenai - West	WMA	921.34	878.26
Kootenai - Woods Ranch	WMA	1,484.07	616.58
Mount Silcox	WMA	1,535.40	1,061.70
North Swan Valley	WMA	1,886.38	1,785.08
Ray Kuhns	WMA	1,556.53	1,205.53
Roundhorn	WMA	27.13	8.06
Total Wildlife Management Area Sites	**10**	**9,499**	**6,986**
Flathead Lake	WHPA	24.96	18.40
Flathead Lake WHPA	WHPA	29.80	23.29
Flathead River WHPA	WHPA	238.47	99.35
Total Wildlife Habitat Protection Areas Sites	**3**	**293**	**141**
Finley Point	SP	34.92	29.15
Lake Mary Ronan	SP	117.90	115.46
Les Mason	SP	7.37	7.11
Logan	SP	1.22	0.30
Lone Pine	SP	254.41	236.70
Thompson Chain of Lakes	SP	2,779.21	2,336.78
Wayfarers	SP	44.58	37.55
West Shore	SP	134.76	129.37
Whitefish Lake	SP	10.70	9.63

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Wild Horse Island	SP	2,112.39	1,138.62
Total State Park Sites	**10**	**5,497**	**4,041**
Region 1 Total	**46**	**16,772**	**12,088**

Table 3 - Summary of Region 2 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Beavertail Pond	FAS	50.10	4.57
Bell Crossing	FAS	65.02	40.76
Bitterroot North	FAS	138.87	61.43
Bitterroot River Parcel 4	FAS	0.73	0.13
Bitterroot River Parcel 4A-6	FAS	36.86	20.73
Bitterroot River Parcel 4A-7	FAS	4.34	4.07
Bitterroot River Parcel 5	FAS	18.00	10.45
Buckhouse Bridge	FAS	3.50	2.32
Deep Creek	FAS	36.14	22.82
Erskine	FAS	403.14	62.87
Florence Bridge	FAS	11.58	3.47
Forest Cooper	FAS	3.03	0.02
Forest Grove	FAS	5.67	4.53
Hannon Memorial	FAS	31.42	13.40
Harper's Bridge	FAS	3.90	1.93
Johnsrud Park	FAS	17.85	8.81
K. Ross Toole	FAS	31.15	19.01
Kelly Island	FAS	696.92	376.15
Lolo	FAS	53.95	13.02
Monture	FAS	111.56	1.00
Poker Joe	FAS	11.62	6.38
River Junction	FAS	129.25	88.62
Schwartz Creek	FAS	14.02	4.27
Stuart Mill Bay	FAS	355.96	187.85
Tarkio	FAS	8.87	7.03
Tucker Crossing	FAS	247.33	108.23
Woodside Bridge	FAS	3.20	1.82
Total Fishing Access Sites	**27**	**2,494**	**1,076**
Blackfoot-Clearwater	WMA	22,344.97	14,855.00
Blue Eyed Nellie	WMA	116.11	24.52
Calf Creek	WMA	2,338.90	1,533.59
Fish Creek	WMA	35,826.68	35,604.28
Garrity Mountain	WMA	9,631.26	7,032.49
Lost Creek	WMA	1,402.60	388.72
Marshall Creek	WMA	24,798.06	24,655.34
Mount Jumbo	WMA	118.10	118.01
Nevada Lake	WMA	1,523.67	1,099.00

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Spotted Dog	WMA	24,102.05	8,611.24
Stucky Ridge	WMA	294.36	71.83
Threemile	WMA	6,419.42	5,562.00
Total Wildlife Management Area Sites	**12**	**128,916**	**99,556**
Beavertail Hill	SP	72.10	31.96
Council Grove	SP	181.78	79.31
Fish Creek	SP	5,565.46	5,422.72
Granite Ghost Town	SP	0.23	0.23
Lost Creek	SP	497.00	269.54
Milltown	SP	130.76	78.77
Placid Lake	SP	30.91	13.59
Salmon Lake	SP	42.10	20.93
Travelers' Rest	SP	36.67	17.49
Total State Park Sites	**9**	**6,557**	**5,935**
Alberton Gorge Recreation Corridor	AFLP	435.37	306.89
Deep Creek	AFLP	99.86	65.30
Total Affiliated Lands/Parks Sites	**2**	**535**	**372**
Region 2 Total	**50**	**138,502**	**106,938**

Table 4 - Summary of Region 3 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Axolotl Lakes	FAS	39.80	12.70
Axtell Bridge	FAS	4.25	2.12
Brownes Bridge	FAS	10.40	2.04
Cameron Bridge	FAS	149.14	108.92
Erwin Bridge	FAS	71.68	34.42
Fairweather	FAS	470.30	101.23
Fishtrap Creek	FAS	82.15	31.15
Four Corners	FAS	9.37	4.62
Grey Owl	FAS	30.85	8.90
Kirk Wildlife Refuge	FAS	13.51	13.14
Sheds Bridge	FAS	0.41	0.20
Springdale Bridge	FAS	12.45	8.21
Sunny Brook Springs	FAS	74.82	74.82
Williams' Bridge	FAS	2.27	1.01
Yorks Islands	FAS	16.32	10.23
Total Fishing Access Sites	**15**	**988**	**414**
Canyon Creek	WMA	3,092.61	2,944.03
Dome Mountain	WMA	4,782.44	37.38
Fleecer Mountain	WMA	6,105.45	1,657.82
Gallatin	WMA	8,613.98	4,932.52
Gravelly-Blacktail	WMA	3,636.00	3.07
Madison-Bear Creek	WMA	3,457.40	1,701.22

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Madison-Wall Creek	WMA	4,958.72	64.61
Mt. Haggin	WMA	57,865.86	34,250.70
Robb-Ledford	WMA	14,020.25	1,021.78
Total Wildlife Management Area Sites	**9**	**106,533**	**46,613**
Silver Gate	WHPA	2.83	2.83
Total Wildlife Habitat Protection Area Sites	**1**	**3**	**3**
Bannack	SP	1,161.75	47.41
Black Sandy	SP	29.13	4.92
Lewis And Clark Caverns	SP	1,821.30	214.71
Total State Park Sites	**3**	**3,012**	**267**
Region 3 Total	**28**	**110,535**	**47,297**

Table 5 - Summary of Region 4 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Cottonwood Grove	FAS	4.03	3.84
Dearborn	FAS	1.40	0.03
Dunes	FAS	55.72	8.22
Fort Logan	FAS	169.83	8.30
Medicine River	FAS	3.50	1.77
Total Fishing Access Sites	**5**	**234**	**22**
Beartooth	WMA	35,070.43	14,764.66
Beckman	WMA	6,316.20	683.22
Blackleaf	WMA	10,668.70	6,040.63
Ear Mountain	WMA	3,022.74	1,352.85
Judith River	WMA	8,344.78	1,390.11
Marias River	WMA	7,255.55	158.11
Smith River	WMA	3,005.91	578.94
Sun River	WMA	14,680.35	2,742.09
Total Wildlife Management Area Sites	**8**	**88,365**	**27,711**
Red Hill Public Access	AFLW	41.24	25.95
Total Affiliated Lands/Wildlife Sites	**1**	**41**	**26**
Sluice Boxes	SP	1,101.15	726.74
Smith River	SP	837.79	532.33
Total State Park Sites	**2**	**1,939**	**1,259**
Region 4 Total	**16**	**90,579**	**29,018**

Table 6 - Summary of Region 5 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Arapooish	FAS	105.57	59.23
Beaver Lodge	FAS	59.41	59.34
Big Rock	FAS	74.00	8.27

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Boulder Forks	FAS	72.38	8.48
Bratten	FAS	92.67	15.98
Buffalo Mirage	FAS	9.99	8.31
Bull Springs	FAS	32.20	31.65
Captain Clark	FAS	117.84	61.51
Castle Rock	FAS	80.60	10.54
Cliff Swallow	FAS	159.96	69.03
Fireman's Point	FAS	162.01	115.91
Grey Bear	FAS	21.39	4.61
Gritty Stone	FAS	13.77	8.64
Horsethief Station	FAS	83.94	76.82
Indian Fort	FAS	15.74	14.54
Moraine	FAS	59.96	0.72
Pelican	FAS	121.98	18.02
Rosebud Isle	FAS	10.91	10.90
Water Birch	FAS	76.78	66.35
Whitebird	FAS	21.44	16.84
Total Fishing Access Sites	**20**	**1,393**	**666**
Haymaker	WMA	1,260.05	500.19
Silver Run	WMA	651.48	209.89
Yellowstone	WMA	3,746.54	317.30
Total Wildlife Management Area Sites	**3**	**5,658**	**1,027**
Yellowstone River	SP	179.35	0.17
Total State Park Sites	**1**	**179**	**0**
Region 5 Total	**24**	**7,230**	**1,693**

Table 7 - Summary of Region 6 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Hinsdale	WMA	126.09	29.14
Total Wildlife Management Area Sites	**1**	**126**	**29**
Region 6 Total	**1**	**126**	**29**

Table 8 - Summary of Region 7 Forested Land

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Rosebud East	FAS	25.99	20.81
Total Fishing Access Sites	**1**	**26**	**21**
Isaac Homestead	WMA	1,002.95	269.31
Total Wildlife Management Area Sites	**1**	**1,003**	**269**
Pirogue Island	SP	226.71	110.89
Rosebud Battlefield	SP	3,108.63	0.44

FORESTED SITE NAME	SITE TYPE	TOTAL ACRES	FORESTED ACRES
Makoshika	SP	11,492.62	2,292.22
Total State Park Sites	**3**	**14,828**	**2,404**
Region 7 Total	**5**	**15,857**	**2,694**

1.8 Relevant Agreements, Laws, Plans, Permits, Licenses, and Other Requirements

This forest management plan, and actions identified and implemented as a result of the direction and guidance provided in this plan, are subject to federal and state laws and other relevant agreements.

Federal

- Endangered Species Act (ESA; 16 U.S.C. § 1531 *et seq.*)
- Bald & Golden Eagle Protection Act (16 U.S.C. § 668 *et seq.*)
- Migratory Bird Treaty Act (16 U.S.C. § 703 *et seq.*)
- Federal Water Pollution Control Act (Clean Water Act) (33 U.S.C. § 1251 *et seq.*)
- Clean Air Act (42 U.S.C. § 7401 *et seq.*)

State Laws

- Montana Environmental Policy Act (MCA § 75-1-101 *et seq.*)
- Nongame and Endangered Species Conservation Act (MCA § 87-5-101 *et seq.*)
- Montana Streamside Management Zone Act (MCA § 77-5-301 *et seq.*)
- Montana Stream Protection Act (MCA § 87-5-501 *et seq.*)
- Montana Water Quality Act (MCA § 75-5-101 *et seq.*)
- Montana Antiquities Act (MCA §22-3-421 *et seq.*)
- Montana Noxious Weed Control Act (MCA § 7-22-2101 *et seq.*)
- Clean Air Act of Montana (MCA § 75-2-101 *et seq.*)
- Montana State Parks Laws (MCA § 23-1-101 *et seq.*)
- Montana Fish, Wildlife & Parks Forest Management Laws (MCA § 87-1-201(9)(a)(iv), § 87-1-621, & § 87-1-622)
- Constitution of Montana – Article X – Section 11

State Rules

- Habitat Montana (ARM 12.9.501 *et seq.*)
- Rules for Implementing the Montana Environmental Policy Act (ARM 12.2.401 *et seq.*)
- Cultural Resources Policy (ARM 12.8.501 *et seq.*)

State Plans

- Montana Fish & Wildlife Conservation and Management Plans (available online at: http://fwp.mt.gov/fishAndWildlife/management/)
- Statewide Habitat Plan (1995)
- Region One Hazard Tree and Forest Management Environmental Assessment (2003)
- Montana Fish, Wildlife and Parks Statewide Integrated Noxious Weed Management Plan (2008)
- 2013 Forest Inventory and Sustained Yield Calculation (2013)
- Montana State Parks & Recreation Strategic Plan 2015-2020 (2014)
- Montana State Wildlife Action Plan (2015)
- State Noxious Weed Management Plan (currently in draft 2017)

Other Requirements

- Montana Forestry Best Management Practices (BMPs)

2. FOREST MANAGEMENT APPROACH

This chapter describes the role of forests on FWP lands and presents FWP's forest management approach, which is the way these forests will be managed to provide the desired outputs–be they ecological, social, economic, etc.–to achieve the objectives of each Division's properties. This forest management approach is based on FWP's forest management philosophy, which provides the reasoning behind the approach.

2.1 Roles and Contribution of Forests on FWP Lands

Each FWP Division views the roles and contributions of forests to its Division mission and objectives slightly differently, however in many cases there are many similarities. Sections 2.1.1 through 2.1.3 provide how each Division values forests in meeting its objectives.

2.1.1 Distinct Roles and Contributions of Forests on Fisheries Division Properties

As previously mentioned in Section 1.6.1, FASs are managed primarily to provide public access for fishing and water-based recreation. Much of the forested land occurring on FASs were part of large tracts that came along with the properties at the time of purchase in the "acquisition package". While forests may not contribute directly to the FAS program's mission of providing access, many FASs are highly valued by the public for uses such as hunting, hiking, and wildlife viewing. The roles and contributions of forests on FASs, in many ways, overlap the roles and contributions of forests on both Wildlife and SP Division properties.

Forested lands on FASs would be primarily managed for public use and recreational values. Within and adjacent to campgrounds and developed day-use areas, forests would be managed for public safety (e.g. wind firm trees and hazard tree mitigation), aesthetics, and visual screening. On larger FASs, outside of developed areas, and/or of secondary concern; forests would be managed for insect infestations and disease infection, fire hazard mitigation, fish and wildlife habitat, and other recreation opportunities. Many sites provide important riparian forest habitat and, if present, adjacent upland forests provide additional habitat functions. If applicable, Ecological Settings (see Section 2.1.2) would be used to identify habitat functions and guide forest management objectives.

Forests on FCAs are primarily valued for providing effective fish and wildlife habitat, especially riparian and wildlife habitats. For the purposes of this forest management plan, FCAs would be managed based on Ecological Settings (see Section 2.1.2), similarly to Wildlife Division properties.

2.1.2 Distinct Roles and Contributions of Forests on Wildlife Division Properties

Montana's Wildlife Division properties include WMAs, WHPAs, and AFLWs. WMAs encompass the most acres of any Wildlife Division site type, and of any FWP site type as well. Montana's WMAs are managed to provide effective wildlife habitat and compatible recreational opportunities. This mission has evolved over time from its early direction when land was acquired and managed based on the fundamental tenet by Aldo Leopold (1933) that "game management is the art of making the land produce sustained annual crops of wild game for recreational use" to the direction provided in the Statewide Habitat Plan

(1995) that states “the basis for management action and decisions on department wildlife land now revolves around improving and enhancing the land’s capability for the benefit of many species and land uses.”

WHPAs and AFLWs are minor Wildlife Division property types. The original intent of WHPAs was to provide nesting habitat for Canada Geese and other birds; recreation is incidental to this primary purpose. AFLWs are a miscellaneous category for other Wildlife Division properties. For the purposes of this forest management plan, all Wildlife Division properties have the same general goal of WMAs which is to provide effective wildlife habitat and compatible recreational opportunities.

The term “Ecological Setting” was coined by FWP specifically for forest management as a term of convenience to categorize and communicate the variety of wildlife habitat functions that occur on Montana’s forested wildlife management areas (FWP 2013). Each ecological setting refers to a grouping of wildlife habitats that support similar functions and therefore may have common management objectives. As an example, riparian forest is perhaps the most straightforward, given its similar wildlife habitat functions, regardless of geographic location. The following describes each habitat setting, associated functions, and general management objective. The overall management approach for each of these is to work within the range of natural variation and utilize strategies that are consistent with natural ecological progressions.

- Mountain Foothills Big Game Winter Range

Figure 4 - The Sun River WMA northwest of Augusta, MT provides winter range habitat for the Sun River elk herd and is an example of the Mountain Foothills Big Game Winter Range Ecological setting. Photo credit: B. Lonner, FWP

This ecological setting generally comprises open, lower elevation grass or shrub dominated slopes with a south or west exposure or wind-blown bare ridges with limited snow cover that allows foraging, primarily for elk, deer, and bighorn sheep. Forest habitats in this setting are generally restricted to upper slopes, north facing aspects, or swales, including forest stringers. These forests function to provide adjacent security, protection from weather events, bedding sites, and travel routes. Because of their limited extent, these forests also provide habitat diversity and are used year-round and seasonally by many other wildlife species, including small mammals, furbearers, forest grouse, and song birds.

A general forest management objective associated with Mountain Foothills Big Game Winter Range is to maintain forested types and manage against conifer expansion, particularly where it would inhibit shrub (browse) and grass forage production.

- Forested Big Game Winter Range

Figure 5 - Mature forests with dense crown cover and dominated by Douglas-fir, such as this area in northwest Montana, provide important wintering areas for White-tailed deer and are an example of the Forested Big Game Winter Range Ecological Setting. Photo credit: FWP

Forested big game winter ranges comprise lower elevation forests that have vertical diversity created by multi-layered, uneven-aged forest stands. These stands provide mature conifers with well-developed crowns to capture snow, allowing wintering animals to move more easily across the landscape, and sunlight needed to produce forage such as younger conifers (especially Douglas-fir), arboreal lichens, and forest browse species (e.g., Oregon grape, kinnikinnick, snowberry, serviceberry, and ceanothus). A

fully functional forest winter range has the following characteristics: well-stocked, uneven-aged forest with a significant component of large, older trees; stands dominated by Douglas-fir which provides the best snow intercept and excellent winter forage, along with other species of conifers to provide additional diversity; crown closure of 60-80%; and a good representation of arboreal lichens which are a critical food item for overwintering ungulates.

A general management objective is to retain healthy, mature trees, while also providing for the development of younger stands to replace older-aged mature trees over time, thus sustaining a functional wintering habitat into the future. Achieving these habitat features across the winter range requires a mix of stand conditions that can maintain a significant portion of the forest in near-optimum condition and balances these attributes with site-specific forest health issues, as well as risk of future wildfire.

- Upper Elevation Montane Forest

Figure 6 - The Marshall Creek WMA, northwest of Seeley Lake, MT, is an example of an Upper Elevation Montane Forest Ecological Setting. Photo credit: J. Kolbe, FWP

This Ecological Setting serves a wide variety of functions which vary depending on its location in the state. The drier occurrences of this setting are especially common on steep slopes at upper elevations east of the Continental Divide, whereas the more mesic occurrences form substantial cover west of the Continental Divide. Forests are found on gentle to very steep mountain slopes, high-elevation ridge tops and upper slopes, plateau-like surfaces, basins, alluvial terraces, well-drained benches, and inactive

stream terraces. These are forests that accumulate substantial annual snowfall and serve as seasonal or yearlong habitat for many different wildlife species. These forests also serve watershed functions with ties to stream flows, water quality, and fisheries habitat.

Management objectives for these forests will be derived based on wildlife species composition and priorities, habitat type, forest makeup, watershed function, and other local and regional concerns. For instance, a single forest complex could provide fall elk security cover, Canada lynx foraging habitat, breeding habitat for a variety of priority neotropical migratory birds, and a source of clean water for westslope cutthroat trout.

- Riparian Forests

Figure 7 - The Yellowstone WMA east of Billings, MT is an example of the Riparian Forest Ecological Setting. Photo credit: FWP

Relative to adjacent uplands, riparian zones support an increased abundance, diversity, and number of unique plant species that are associated with these areas of higher moisture. These unique plant communities subsequently support unique wildlife communities and ecological functions, and many wildlife species depend on riparian communities for at least part of their life cycle. Natural processes, including floods, fire, and other fluvial processes are primary factors affecting riparian plant composition and succession. Artificial manipulation, such as timber harvest and livestock grazing can also directly affect riparian communities and successional patterns within these communities. Trees, shrubs, and

herbaceous vegetation within riparian habitats serve many wildlife habitat functions and are highly valued because of their productivity and unique composition of both plant and animal communities.

The overall management objective for riparian areas is to allow them to grow to their full potential as wildlife and fisheries habitat while also allowing normal hydrogeomorphic processes that help to sustain all of these important habitat attributes and riparian functions.

- Juniper Woodlands

Figure 8 - The Blackleaf WMA northwest of Choteau, MT is an example of the Juniper Woodlands Ecological Setting. Other tree species may be present, such as limber pine, as illustrated in this photo. Photo credit: FWP

Rocky mountain juniper is a dominant shrub or tree on some portions of wildlife management areas around the state. Depending on the location; limber pine, Douglas-fir, or rarely, ponderosa pine or lodgepole pine occur within this setting. This setting occurs on sites that are characterized by extreme winter weather, droughty summer conditions, rocky sites, shallow soils, and are marginal for tree growth. Junipers provide hiding cover, browse, and nesting structure that can otherwise be in limited supply. Whereas these woodlands can have high wildlife value, they tend to be slow growing and stable.

The general management objective is to retain existing juniper woodlands. If FWP conducts clearing projects for conifers that have pioneered into open grasslands in areas that also support Rocky Mountain junipers, as a general rule the junipers will be retained because of their wildlife habitat values.

2.1.3 Distinct Roles and Contributions of Forests on Parks Division Properties

The presence of forested areas and their species composition varies between Parks Division properties, based largely on location across the state. Where present, forested areas contribute to the fabric of these important places and lend considerable value to the recreational, cultural and natural qualities of the site and overall visitor experience.

Figure 9 - Forests on State Parks contribute significant value to the overall visitor experience. Photo credit: D. Landstrom, FWP

Forest settings are often a mainstay of visitor expectations, providing aesthetics (look, feel, smell and sound), screening (view and noise), shade, and wildlife viewing opportunities that add to the overall quality of visitor experience. For example, pine and fir forest types can provide the quintessential settings and surroundings for activities such as camping, hiking or mountain biking. In other cases, Ponderosa pines scarred by the cambium harvest of native peoples or a riparian cottonwood gallery along the route of Lewis and Clark, add authenticity and sense of place to interpretive and educational experiences. Additionally, forested areas in Parks Division properties provide necessary habitat for a wide range of plant and wildlife species, offering opportunities for visitors to interact with and observe the natural environment.

The overall forest management objective for Parks Division properties is to maintain healthy forests that enhance recreational opportunities while protecting cultural and natural values for the benefit of the public. High volumes of public use and proximity to neighboring private and public properties regularly require proactive management efforts to address issues posed by forested areas such as fire hazard, forest insects, disease mortality, hazard trees and public safety. Mitigating these issues is a key forest management priority in conjunction with, where possible, allowing natural processes to occur and maintaining habitat values. The Parks Division relies heavily on the expertise and partnerships of other agencies and professionals to accomplish forest management projects, including Montana DNRC, U.S. Forest Service, county governments and forest products companies. Guiding principles for forest management projects in the Parks Division include:

- Creating a forest structure that improves forest resilience to insect and disease infestations.

- Reducing fuel loads and ladder fuels, and lowering the risk of stand-replacement fire to protect the parks and adjacent private lands as well as improving emergency access at sites and providing safer working environments.
- Removing trees that are potentially hazardous to park visitors and facilities within highly developed areas.
- Restoring the parks to the historic, large, open stand structure when applicable.
- Maintaining and improving the aesthetic and recreational value of the Parks' forests.
- Maintaining or improving wildlife habitat.
- Supplying any resulting merchantable materials to local mills.

2.2 Forest Management Philosophy

How will FWP manage its forests to meet these somewhat different (and sometimes similar) objectives across Fisheries, Wildlife, and Parks Divisions? FWP's forest management philosophy is to manage for desired habitat conditions and public use opportunities while maintaining the ecological integrity of forests. Maintaining ecological integrity is an underlying principle of FWP's management strategy to ensure the desired outputs from FWP's forested lands can be provided over the long-term. **This philosophy is based on the premise that maintaining ecological integrity will produce a healthy, functioning forest ecosystem able to sustain native species, populations, and genetic diversity as well as sustaining the recreational uses and ecosystem services desired from these lands**.

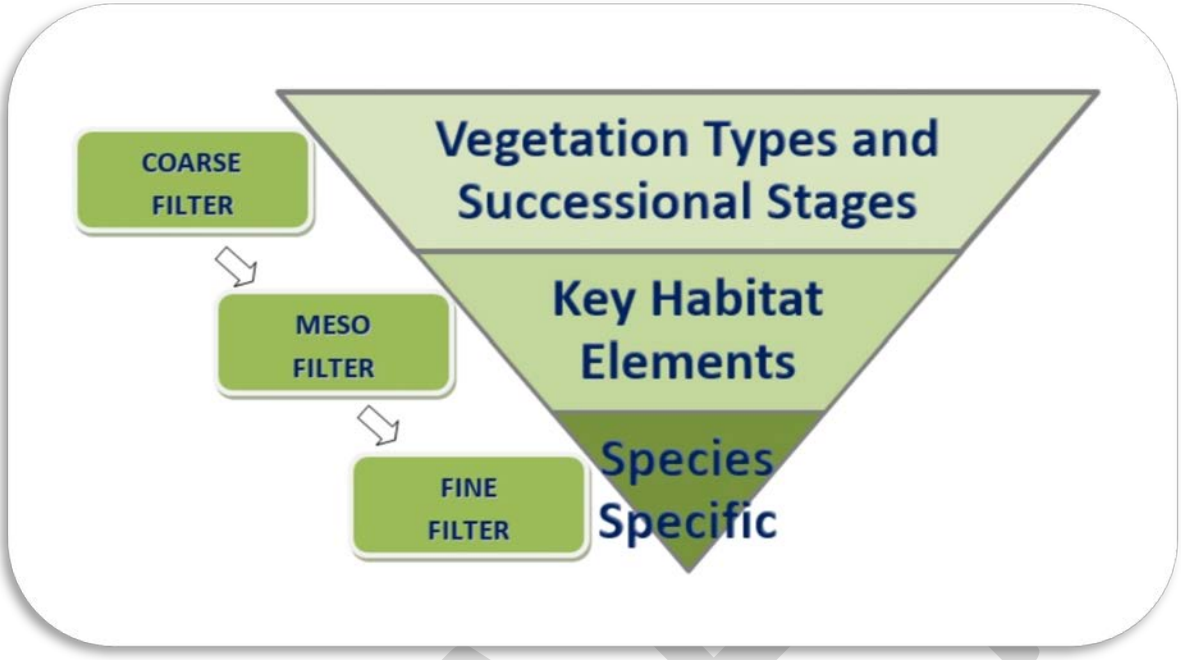
Managing for desired habitat conditions and public use opportunities while maintaining ecological integrity is an overarching strategy for all forested lands managed by FWP, but it is recognized that on a site-specific basis there are other resources values and concerns. In consideration of these, FWP has built in Special Management Areas for forested lands that would be managed based on site-specific resource objectives.

2.3 The Filter Approach

FWP will employ an adaptation of the "filter" approach to meet its objectives while maintaining ecological integrity of forests. The filter approach is a hierarchal approach using three management strategies, termed filters. It has been promoted by scientists as a valuable method in conserving biodiversity (The Nature Conservancy 1982, Noss 1987, Hunter et al. 1988, Hunter 1991, Haufler et al. 1996, Groves 2003, Hunter 2005). Conserving biodiversity is not specifically a driver for forest management but rather it is recognized that "to keep every cog and wheel is the first precaution of intellectual tinkering" (Leopold 1949). The three filters in this approach are the coarse filter, mesofilter, and fine filter.

Biodiversity is defined as the genes, organisms, populations, and species of an area, and the ecosystem processes supporting them.

Figure 10- Schematic of the "Filter" Approach



2.3.1 Coarse Filter Approach

The coarse filter approach is a strategy for ensuring ecological integrity at a landscape scale. One author's definition of the coarse filter approach is: conserving species diversity by providing adequate representation (distribution and abundance) of ecological land units considering the historic range of variability based upon an understanding of the natural disturbance regimes of the ecological land units (Haufler et al. 1996). This approach considers broad landscapes, often comprising multiple land ownerships.

The premise of the coarse filter approach is to manage habitats to sustain species that have adapted to natural and human-influenced disturbance regimes and processes operating in that landscape (Holling 1973, Swanson et al. 1993, Reeves et al. 1995, Landres et al. 1999). Some have suggested management that attempts to emulate historical disturbance regimes will produce plant community compositions and structures that historically supported all native biodiversity (Hunter 1993, Swanson et al. 1993, Cissel et al. 1994, Haufler et al. 1999, Landres et al. 1999, Kuuluvainen 2002). FWP's adaptation of this coarse filter approach is to manage for native vegetation communities within the constraints of site potential while also considering how FWP properties fit within larger landscapes.

Historic range of variability is defined as the range of variation of ecological structures and processes during the historic reference period.

2.3.2 Mesofilter Approach

The mesofilter approach focuses on smaller entities and structural elements. While the coarse filter approach may ensure that adequate habitat conditions are provided for many species, some species require certain structural elements to ensure they will persist within an area. For many of FWP's Wildlife Division properties, it is the unique habitat elements that provided the motivation for acquiring them as WMAs. One author's definition of the mesofilter approach is conserving key habitat elements that are important to species but too fine to address through the coarse filter approach, so that many species will be protected without needing to consider them individually (Hunter 2005). The author's definition uses the word "protected" but in many cases FWP's objective will be to promote and sustain these habitat elements to assure habitat functions are retained into the future, particularly for targeted species. On WMAs, WHPAs, and FCAs, this filter generally addresses the primary purposes for which particular properties were acquired (e.g. big game winter habitats, river bottom riparian habitats with associated game abundance).

2.3.3 Fine Filter Approach

The fine filter approach focuses on species or species guilds (i.e. a group of species that exploit the same resources, often in related ways). Some species that are rare, specialized, and/or have been adversely affected by habitat loss or other factors require special attention. The fine filter approach can be defined as conserving individual priority species that are not adequately addressed by the coarse and/or mesofilter approaches. For instance, reducing conifer canopy coverage below a certain threshold in sagebrush stands for sage-grouse or managing for a specific forest structure for Canada lynx are examples of fine filter strategies.

Figure 11 - An example of a fine filter approach is identifying DFCs based on conserving a priority species. Research indicates that greater sage-grouse (Centrocercus urophasianus) use of sagebrush grassland habitat for nesting is negatively impacted when conifer tree density exceeds 3% (Severson et. al 2016). This area on the Robb-Ledford WMA would have conifers removed from sagebrush grassland to enhance habitat for sage-grouse. Photo credit: J. Parke, FWP

2.4 Special Management Areas

The filter approach is a management strategy to sustain and/or promote native species while maintaining ecological integrity to provide the desired outputs and ecosystem services expected from FWP's forested lands over the long-term. However, there are cases where certain resource values are either not addressed or conflict with the filter approach. Hazardous fuels in the wildland-urban interface, visual resources within developed campgrounds, or hazard trees along public routes or within high public-use areas are some examples of where a different approach would need to be taken. Special Management Areas generally support public use, aesthetic, safety, or other human-related concerns influencing the development of site specific DFCs.

3. IMPLEMENTATION

The forest management approach described in Chapter 2 provides FWP's forest management strategy and defines an approach to achieving objectives for its forested land. This chapter will present the process for developing DFCs, management actions that can be taken to achieve DFCs, management tools that can be used to implement those actions, and monitoring and reporting requirements.

3.1 Developing Desired Future Conditions

A DFC is a description of what the forest should look like after implementation of a property-specific management plan or project. Since forests are constantly changing through succession and disturbance, DFCs are not expressed as a static end-state condition but rather as a range of conditions. The results of the filter analyses will provide FWP with the information necessary to develop DFCs. Of course, Special Management Area designations may provide FWP with alternative DFCs. Additionally, internal and external input received during planning and/or project development would be considered in the development of DFCs.

3.1.1 Coarse Filter Analysis

Conducting an adequate coarse filter analysis is a crucial step since the premise of the coarse filter approach is that it will maintain ecological integrity thereby conserving most native species. The results of this analysis provide an important piece of the information necessary for developing DFCs.

As you will see in the process outlined in this section, there is some discretion allowed in what information sources should be used to conduct this analysis. The reason for discretion is that there are several information sources, Geographic Information System (GIS) methods, computer software programs, and analysis tools with new analysis tools and systems currently being developed. FWP has limited time, resources, and funding to conduct this analysis; allowing discretion will allow FWP to take advantage of the best available information sources and analysis tools at the time the analysis is conducted, or utilize an analysis that has been previously conducted on the landscape. The process for conducting a coarse filter analysis is described below.

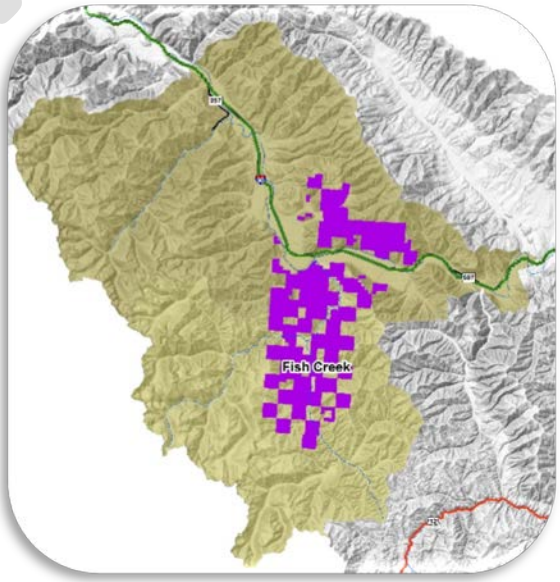


Figure 12 - The coarse filter analysis assesses FWP properties in the context of the landscape. Hydrological units (HUCs) can be useful analysis areas.

1. <u>Delineate an analysis area</u>

The size and extent of an analysis area will depend on historical range of variability (HRV) of disturbances and vegetation communities. An analysis area must be big enough to contain the extent of historical (pre-Euro-American settlement) disturbance events but small

enough to detect changes resulting from present day disturbances or management activities. The Fire Regime Condition Class (FRCC) assessment system, which is a coarse filter analysis tool, developed suggested minimum size ranges for landscape delineation that are a useful guide in delineating an analysis area. When historical disturbance events within the area to be analyzed fall into multiple fire regime groups, the analysis area should be scaled to the group that requires the largest size delineation. The appropriate sized hydrological unit or units (HUCs), based on the National Hydrography Dataset watershed hierarchy can be very useful boundaries for coarse filter analysis areas.

Table 9 - Historic Fire Regime Groups and Suggested Minimum Size Ranges (acres) for FRCC Landscape Delineation (Barrett et al. 2010)

Fire regime group (mean fire return interval, severity)	Assessment area size (acres)
I – 0-35 years, low/mixed	500 – 5,000
II – 0-35 years, replacement	500 – 10,000
III – 35-200 years, mixed/low	5,000 – 20,000
IV – 35-200 years, replacement	20,000 – 500,000
V – 200+ years, low/mixed – 200+ years, replacement	1,000 – 20,000 200,000 – 500,000

2. Identify potential vegetation communities

Once an analysis area has been delineated, the potential vegetation within the analysis area will be identified. There are several classification systems for potential vegetation communities and this plan does not suggest that only one classification system be used. The selection of the vegetation classification should, at a minimum, include a description of:

- geographic range and/or distribution;
- biophysical site description/environment;
- vegetation; and
- disturbances/dynamic processes (e.g. fire, insects, disease, successional patterns).

Figure 13 - The Rocky Mountain Montane Douglas-fir Forest and Woodland Ecological System, pictured here on the Spotted Dog WMA, is a common vegetation community on many Mountain Foothills Big Game Winter Ranges. The MNHP maintains descriptions of this vegetation community on their website. Photo credit: J. Parke, FWP

Examples of useful vegetation classification systems include Biophysical settings developed by the LANDFIRE program (LANDFIRE 2013), NatureServe's Ecological Systems classification (Comer et al. 2003), Montana Natural Heritage Program's (MNHP) Ecological Systems which are based on the NatureServe classification, and Forest Habitat Types of Montana (Pfister et al.

1977) in combination with fire groups developed by Fischer and Bradley (1987) for habitat types west of the Continental Divide or by Fischer and Clayton (1983) for habitat types east of the Continental Divide.

3. Establish reference conditions

Perhaps the most essential part of the coarse filter analysis is establishing reference conditions for the vegetation communities within the analysis area. Reference conditions are the range of historic (or natural) variability in ecological structures and processes, reflecting recent evolutionary history and the dynamic interplay of biotic and abiotic conditions and disturbance patterns (Morgan et al. 1994, Swanson et al. 1994). Reference conditions serve as a benchmark for comparing current conditions and strongly influence the development of DFCs. Similar to DFCs, reference conditions represent a range of conditions and not static-state conditions. The key reference condition attributes that will be established for the potential vegetation communities within the analysis area include the historic (pre-Euro-American settlement) range of variability of:

- vegetation composition, disturbance regime, and successional pattern;
- succession class (SCLASS) distribution;
- patch sizes and arrangement (based on disturbance types and sizes); and
- where sound scientific data is available, the future range of variability (FRV) of vegetation composition, disturbance regimes, succession pattern, SCLASS distribution, and patch size and arrangement.

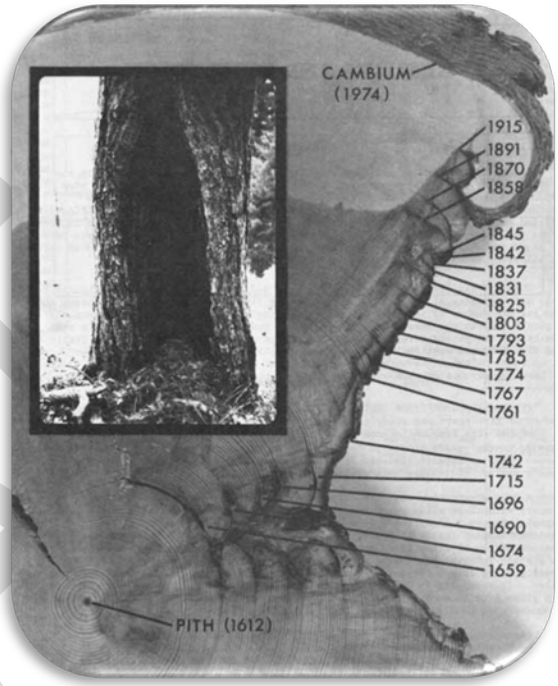


Figure 14 - Forest ecologists have used tree ring studies to understand the historical role of fire. This cross section of a tree stump from the Bitterroot National Forest shows that fires were frequent; occurring on average every 12 years between 1659 and 1915. Photo credit: Bitterroot National Forest

Figure 15 - These photo points of the Sawtooth Ridge from 1900 (left) and 1981 (right) are one source that can be used to establish a reference condition for the Sun River WMA. Photo credit: University of Montana—Missoula. Mansfield Library

Just as the spatial extent of the analysis area is important, the temporal extent of the reference conditions is equally important. There is no single correct or widely applicable HRV reference period. Researchers have suggested that the conditions present prior to Euro-American settlement provide useful HRV reference conditions. Paleoecologists have determined that prior to 10,000 years before present, plant communities are not analogous with modern communities (Overpeck, Webb, & Prentice 1985) and that the vegetation patterns and communities of today did not start to appear until the last 6,000 to 8,000 years (Webb 1987; Jacobson, Webb, & Grimm 1987; Ritchie 1987). Therefore, the HRV reference period should be less than 6,000 years before present and representative of conditions prior to Euro-American settlement. Climate variability during this time period undoubtedly overlaps with future climates, making it a useful for establishing reference conditions. In general, the direction for establishing reference conditions is to use the best available HRV reference conditions based on:

- relatively consistent climatic, edaphic, topographic, and biogeographic conditions (Morgan 1994);
- time periods whose climates are similar to those anticipated in the future (Hessburg et al. 2015); and
- time periods long enough to cover multiple disturbance cycles (approximately 1,000 to 2,000 years).

When HRV reference conditions are based on climates that highly differ from those anticipated in the future, they will be far less useful (Hessburg et al. 2015). The FRV can be used to provide alternative reference conditions that are suited to a predicted future climate (Hessburg et al. 2013; Keane et al. 2009; Moritz et al. 2011, 2013). FRV is an emerging concept, but FRV models are not consistently available at a regional scale (Haugo et al. 2014). Where HRV reference conditions have been deemed as not applicable because they differ highly from predicted climates, FWP will use FRV reference conditions when scientifically sound information becomes available.

Future range of variability is defined as the estimated range of ecological structures and processes that may occur in the future based on predicted future climates.

Potential information sources for establishing HRV reference conditions include Biophysical setting descriptions developed by the LANDFIRE program (LANDFIRE 2013); historical records such as USFS documents or General Land Office surveys; historical accounts or photographs; reconstructive studies; or physical evidence occurring in the forest themselves such as remnant trees, snags, and stumps.

4. Describe current conditions

The current condition attributes (e.g. successional stage, vegetation composition, actual disturbance history, etc.) of the vegetation communities in the analysis area should be compatible with the reference condition attributes to allow for comparison of the two. Current conditions are readily available from several sources. Example sources of current conditions include FWP's forest stand layer

geodatabase, USFS existing vegetation mapping program (VMap), aerially detected insect and disease maps maintained by the USFS Forest Health Protection and partners, fire history polygons maintained by the USFS Northern Region, and the Montana Spatial Data Infrastructure (MSDI) Land Use/Land Cover dataset maintained by the Montana Natural Heritage Program.

5. Compare current conditions to reference conditions

The final step in the coarse filter analysis is to compare the current and reference conditions which will determine the departure between the conditions and help guide the development of coarse filter DFCs. A variety of GIS methods and software can assist with this analysis such as ESRI's ArcGIS Spatial Analyst tools; FRCC developed by several interagency partners and organizations; the Landscape Management System developed by the University of Washington, the USFS, and others; Simulating Patterns and Processes at Landscape Scales (SIMPPLLE) developed by the USFS; or Conservation Assessment and Prioritization System developed by the University of Massachusetts.

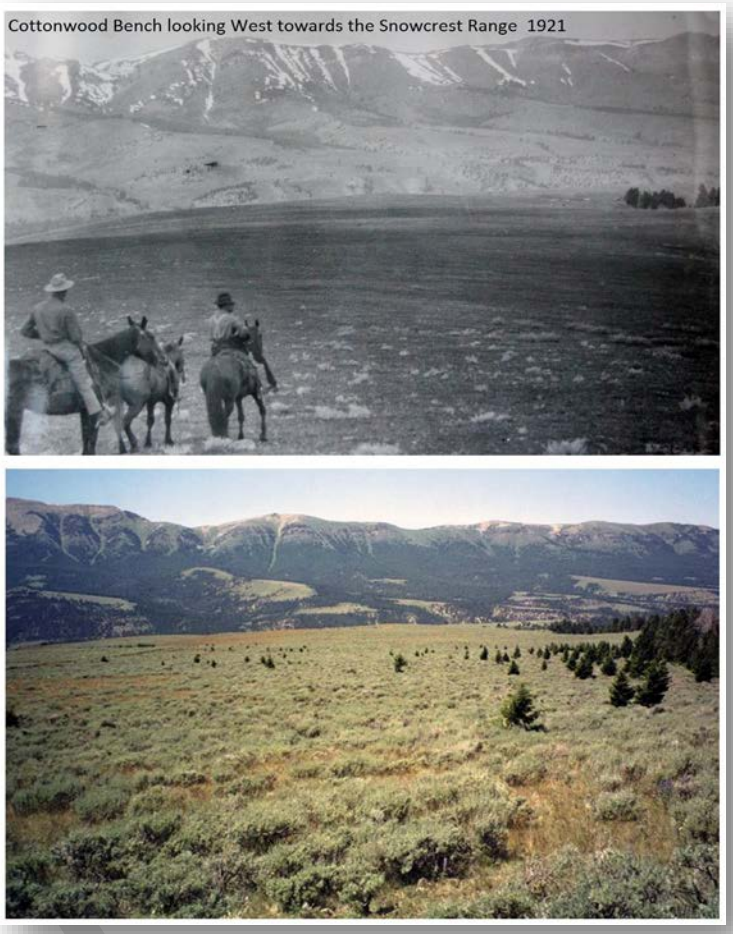


Figure 16 - The coarse filter analysis would evaluate departure of current conditions from the historic range of variability. This photo point shows that significant conifer expansion has occurred since 1921 along the east side of the Snowcrest Range in Madison County, MT. Photo credit: D. Waltee, FWP

The purpose of the coarse filter analysis is to provide FWP with a measure of ecological integrity by providing information about the degree of departure from the historic (or natural) range of variability, as determined by reference conditions. This information will be used to develop coarse filter DFCs by evaluating the acceptable degree of departure from reference conditions at the landscape level and determining if there is a need (and opportunity) to address departure at the FWP property or project planning level. This evaluation will consider the relationship between ecological integrity and the ability to provide desired outputs from FWP's forested lands (e.g. habitat and public use opportunities) in the short and long-term.

3.1.2 Mesofilter Analysis

Conducting the mesofilter analysis involves focusing on key habitat elements for targeted species. It includes habitat elements that are critical to the welfare of targeted species and are often too fine to

address in the coarse filter (e.g. snags, coarse woody debris). Ecological settings (FWP 2013) will be used to identify which key habitat elements will be analyzed in the mesofilter analysis. Since ecological settings categorize different wildlife habitats, it provides FWP with a consistent way to determine which elements to analyze based on common habitat functions. Additionally, there are a number of habitat elements that are common to most ecological settings and, if present, these would be analyzed in the mesofilter analysis.

There are several options for analyzing key habitat elements. Some habitat elements are clearly measurable and can be analyzed quantitatively, some elements are more easily described qualitatively, and others are better suited for establishing guidelines rather than conducting analysis of amounts of the element in a given area. The steps below outline the process for conducting mesofilter analysis:

1. Identify the appropriate habitat elements

This first step will be to list the habitat elements to analyze. FWP will select the appropriate ecological setting for the property or project to identify the list of key habitat elements to analyze and also determine if there are habitat elements that are common to all ecological settings present. FWP will identify these elements based on available scientific results and literature when possible and incorporate new science as it becomes available. If a property or project falls in to multiple ecological settings, ensure all habitat elements from each ecological setting are accounted for. Duplicate habitat elements will be combined and analyzed appropriately in the next steps (e.g. forage on the Mountain Foothills Big Game Winter Range ecological setting and forage on Upper Elevation Forest ecological setting). FWP wildlife biologists may include additional habitat elements to be analyzed based on site-specific concerns.

2. Select appropriate analysis method for habitat element

- *Quantitative* – for habitat elements that can be clearly defined and measured, a quantitative analysis would be conducted. Steps for quantitative analysis:
  - Identify appropriate sized analysis area and temporal scale
  - Define the habitat elements in measurable terms (for example, hiding cover is defined as vegetation capable of hiding 90% a big game animal at a site distance equal to or less than 200 feet)
  - Describe current conditions (availability of habitat element within the analysis area)
  - Establish DFC for the habitat element

- *Qualitative* – some habitat elements are more easily described rather than defined by clearly measurable terms. For example, quality wintering areas for White-tailed deer in the Forested Big Game Winter Range ecological setting can be described as relatively mature forest stands, characterized by large trees and relatively closed tree canopy cover at lower elevations (FWP 2006). An amount of forest in this condition within a given area can be identified (current condition) and a DFC can be established.

- *Guidelines* – for some habitat elements it is difficult to quantitatively measure or qualitatively describe the element, identify an analysis area, and/or compare current conditions to desired amounts. For example, snags and defective trees are a key habitat element common to most ecological settings. These come in many forms including trees with dead and broken tops to dead trees in varying stages of decay and the amounts of these can vary widely across the landscape with some areas having very few and some areas having a lot. Establishing guidelines for snags and other habitat elements may be more useful than comparing current conditions to optimal amounts in a given analysis area.

Key Habitat Elements Common to Most Ecological Settings

There are several key habitat elements that may occur across most ecological settings so rather than listing each one multiple times in the ecological setting tables below, they are presented once here. These habitat elements, if present, would always be analyzed in the mesofilter analysis. These key elements include snags, coarse woody debris, legacy trees, connectivity of habitat, aspen, and riparian forest. Riparian forest is also a stand-alone ecological setting.

- Snags

Snags and defective trees (partially dead, spike top, broken top etc.) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags provide foraging sites for insectivorous species and sites for nesting and roosting birds and animals. Primary excavators of nest cavities (e.g. woodpeckers) create holes and nest sites for secondary cavity users, which include many other birds and mammals. Snags and defective trees can also provide nesting sites for cavity-using species where cavities are formed by broken tops and fallen limbs. Without trees and snags that provide for cavities or substrate for cavity excavation, primary and secondary cavity species would not be able to survive and/or reproduce. Snags and defective trees would be conserved by guidelines developed at the property or project level.

- Coarse Woody Debris (CWD)

Coarse woody debris (CWD) provides structural diversity and promotes biological diversity by providing habitat for many wildlife species. Many small mammals require coarse woody debris to survive. In turn, these species distribute fungi that are beneficial for seedling establishment and tree growth (Graham et al. 1994). Additionally, coarse woody debris can provide feeding substrates for species such as pileated woodpeckers and black bears, as logs will often host high densities of insects (Aney and McClelland 1985). CWD would be conserved by guidelines developed at the property or project level.

- Legacy Trees

Several Species of Greatest Conservation Need (SGCN) require mature trees for nesting, roosting or cover. Species such as Bald Eagles often nest in decadent cottonwoods; Flammulated Owls prefer late-successional forests, and Olive-sided Flycatchers use open habitats within late-successional forests.

Determinations on desired legacy trees will be made during the fine filter analysis. In general, efforts will be made to retain some of these older, legacy trees for wildlife habitat.

- Connectivity of Habitat

Many of the SGCN found in Montana are sensitive to habitat fragmentation and patch size. Local species composition and habitat needs, based on the results of the fine filter analysis, will be used to guide this level of planning. In general, efforts will be made to avoid or minimize increases in edge habitat or fragmentation.

- Aspen

Aspen provides important cover, foraging, nesting, cavity lodging, roosting, and breeding habitat for a wide variety of wildlife as well as microsites for unique understory vegetation. This ecological setting primarily occurs within other ecological settings. Common ecological systems (based on NatureServe's classifications) associated with this ecological setting include:

  - Aspen and mixed conifer forest
  - Aspen forest and woodland

Table 10 - Aspen Key Habitat Elements

Key Habitat Element	Function	How the element would be analyzed or conserved
Cover	Provides shade for wild ungulates in the summer and year-round and seasonal cover for a variety of birds and small mammals. In grasslands, aspen may be the only cover available.	Would be analyzed similarly to other cover in other Ecological Settings. Structural definition, optimal amounts, and analysis areas would be defined at the property or project level.
Forage	Aspen bark, foliage, twigs, buds, catkins, and sprouts; as well as the various understory species in aspen stands; provide forage for a wide variety of wildlife.	Optimal amounts, quantity, quality, and analysis area would be identified at the property or project level.
Nesting	Aspen provides canopy, ground, shrub, and cavity nesting.	Optimal amounts, quantity, quality, and analysis area would be identified at the property or project level.
Roosting	Provides resting habitat for raptors, owls, and several game bird species.	Optimal amounts, quantity, quality, and analysis area would be identified at the property or project level.
Breeding	Aspen provides courting, mating, and brood habitat, especially for ruffed grouse, as well as providing breeding habitat for a wide variety of species.	Optimal amounts, quantity, quality, and analysis area would be identified at the property or project level.

Key Habitat Element	Function	How the element would be analyzed or conserved
Species and habitat diversity	Depends on the aspen community type, conifer-to-aspen ratio, overstory aspen condition, structure, regeneration, amount of browsing, and insects and diseases.	Aspen would be managed based on the aspen community type and guidelines would be and developed at the property or project level.

- Riparian forest

This ecological setting often occurs within other ecological settings as well as being a stand-alone setting. Forests may dominate this setting (such as in the Rocky Mountain Conifer Swamp ecological system; or forests are found along the fringe such as in the Rocky Mountain Subalpine-Montane Fen ecological system. Common ecological systems (based on NatureServe's classifications) associated with this ecological setting include:

- Rocky Mountain Subalpine-Montane Fen
- Rocky Mountain Wooded Vernal Pool
- Great Plains Floodplain
- Great Plains Riparian
- Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
- Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland
- Rocky Mountain Subalpine-Montane Riparian Woodland
- Rocky Mountain Conifer Swamp

Table 11 - Riparian Forest Key Habitat Elements

Key Habitat Element	Function	How the element would be analyzed or conserved
Riparian buffers	Maintain water quality and protect critical wildlife habitat adjacent to streams and rivers.	Guidelines for maintaining sufficient vegetated buffers along streambanks would be developed at the property or project level.
Streambank stability	Allows for natural stream migration processes, resists accelerated erosion and sedimentation, maintains stream depths, provides shelter for fish, maintains stream temperature, affects amounts of nutrients and oxygen entering stream, and is an area of unique species diversity. Trees, understory vegetation, and woody debris help maintain streambank stability.	Guidelines for maintaining or restoring streambank vegetation would be developed at the property or project level.

Key Habitat Element	Function	How the element would be analyzed or conserved
Improved water quality	Trees, understory vegetation, and woody debris trap and filter sediment and affect the amount of nutrients and oxygen entering the stream.	Guidelines for how riparian forests would be managed for water quality would be developed at the property or project level.
Reduced stream temperatures	Trees, understory vegetation, woody debris, and the associated effects to streambank stability affect water temperature by shading the stream surface and are particularly important in headwater streams that have lower volumes of water.	Guidelines for how riparian forests would be managed for affecting stream temperature would be developed at the property or project level.
Travel corridors and landscape connectivity	The linear form of riparian areas may serve as critical wildlife corridors allowing for movement between different habitat areas. Riparian corridors may be important for dispersal of juveniles.	Guidelines for how riparian forests would be managed for providing travel corridors and landscape connectivity would be developed at the property or project level.
Species and habitat diversity	The vegetative community in most riparian areas is structurally more varied than adjacent landscapes and thereby provides a rich diversity of habitat niches. This diversity translates to the fulfillment of the primary life requisites (e.g.; food, cover, reproductive habitat) for a wide variety of wildlife. Water, aquatic invertebrates, and fish provide resources that support species that inhabit and utilize an aquatic/upland ecotone.	Guidelines for how riparian forests would be managed for species and habitat diversity would be developed at the property or project level.
Large woody debris	Slightly different from the functions provided by coarse woody debris (CWD), large woody debris in riparian forests affects the configuration of a stream by diverting water flow and forming pools. The debris help regulate storage of sediment, particulate, and organic matter, and provide aquatic habitat. Large woody debris also affects lakeshores by providing aquatic habitat and by forming natural revetments that shelter the shore, causing beaches to form.	Large woody debris would be conserved by guidelines developed at the property or project level.

Mountain Foothills Big Game Winter Range Key Habitat Elements

Big game winter range represents the area where deer, elk, antelope, bighorn sheep, moose, and mountain goat spend the snowy, cold months of winter. These unique habitats exist where a combination of elevation, slope, aspect, vegetation, and other characteristics provide animals with food, protection from harsh weather conditions, and security. Consequently, winter ranges are limited to unique areas. Animals that may have occupied thousands of acres of summer/fall range can be seasonally confined to relatively restricted geographic areas on which forage is limited and environmental conditions can cause physiological stress (Youmans 1999). This limited habitat area is generally found at lower elevations (mountain foothills and valley floors) (Vore 2012).

The key habitat elements identified for this ecological setting generally focus on features that are important for elk and deer during harsh winter conditions, although these features also provide habitat that important to a variety of wildlife both seasonally and year-round. As one example – good thermal cover for elk and deer is characterized by mature, closed canopy conifer forest stands which are also the same conditions preferred by northern goshawks for nesting.

Elk winter range is a good example of this ecological setting. Using the elk winter range distribution dataset maintained by FWP, elk winter range is commonly associated with the ecological systems (based on NatureServe's classifications) listed below. This is provided only as an example of the potential vegetation communities associated with the Mountain Foothills Big Game Winter Range Ecological Setting. The list is ordered by the top 10 ecological systems which accounts for about 66% of the ecological systems commonly associated with elk winter range; forest ecological systems are denoted by an asterisk:

- Montane Sagebrush Steppe
- Rocky Mountain Lower Montane, Foothill, and Valley Grassland
- Big Sagebrush Steppe
- Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest*
- Rocky Mountain Montane Douglas-fir Forest and Woodland*
- Rocky Mountain Lodgepole Pine Forest*
- Rocky Mountain Mesic Montane Mixed Conifer Forest*
- Great Plains Mixedgrass Prairie
- Great Plains Ponderosa Pine Woodland and Savanna*
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland*

Table 12 - Mountain Foothills Big Game Winter Range Key Habitat Elements

Key Habitat Element	Function	How the element would be analyzed or conserved
Thermal cover	Vegetative cover, primarily used by deer and elk, that assists in maintaining homeothermy.	Structural definition, optimal amounts, and analysis area would be defined at property or project level. For elk, concepts from "U.S. Forest Service and Montana Department of Fish Wildlife and Parks Collaborative Overview and Recommendations for Elk Habitat Management on the Custer, Gallatin, Helena, and Lewis and Clark National Forests" (FWP and USDA Forest Service 2013) would be applied, if applicable.
Hiding cover	Allows big game to use areas for bedding, foraging, thermal relief, wallowing, and other functions year-round. May contribute to security but does not necessarily provide security during hunting season.	Defined as vegetation capable of hiding 90% a big game animal at a site distance equal to or less than 200 feet. Optimum amounts and analysis area would be defined at the property or project level. For elk, concepts from "U.S. Forest Service and Montana Department of Fish Wildlife and Parks Collaborative Overview and Recommendations for Elk Habitat Management on the Custer, Gallatin, Helena, and Lewis and Clark National Forests" (FWP and USDA Forest Service 2013) would be applied, if applicable.

Key Habitat Element	Function	How the element would be analyzed or conserved
Security areas	Any area that will hold big game because of its geography, topography, vegetation, or a combination of these features.	For elk, concepts from the "Hillis paradigm" (Hillis et al. 1991), "Security areas for elk during archery and rifle hunting seasons" (Ranglack et al. 2007), and "U.S. Forest Service and Montana Department of Fish Wildlife and Parks Collaborative Overview and Recommendations for Elk Habitat Management on the Custer, Gallatin, Helena, and Lewis and Clark National Forests" (FWP and USDA Forest Service 2013) would be applied, if applicable. Consideration for other big-game species, definitions, optimal amounts, and analysis area would be defined at the property or project level.
Daily movement corridors	Allows big game to move from bedding to feeding areas.	Structural definition, optimal amounts, and analysis areas would be defined at the property or project level.
Forage	Vegetation including but not limited to forest understory grasses, forbs, shrubs, and trees as well as lichens, mosses, fruits, seeds, and roots that provides nutrition to wildlife year-round.	The potential forage species depends on the potential vegetation community. Important forage species would be identified and optimal amounts, quantity, quality, and analysis area would be identified at the property or project level.

Forested Big Game Winter Range Key Habitat Elements

While there is likely some overlap between Mountain Foothills Big Game Winter Range and Forested Big Game Winter Range, there are some key differences that set them apart. Forested Big Game Winter Range is mostly west of the Continental Divide, is characterized by forested ecological systems, and is more mesic than Mountain Foothills Big Game Winter Range. Forested Big Game Winter Ranges are typically comprised of low to mid elevation forests and are important White-tailed deer winter range in western and northwestern Montana.

White-tailed deer winter range west of the Continental Divide is a good example this ecological setting. Using the White-tailed deer winter range distribution dataset maintained by FWP, White-tailed deer winter range west of the Continental Divide is commonly associated with the following ecological

systems (based on NatureServe's classifications) listed below. This is provided only as an example of the potential vegetation communities associated with the Forested Big Game Winter Range Ecological Setting. The list is ordered by the top 5 ecological systems which account for approximately 64% of ecological systems commonly associated with White-tailed deer winter range west of the Continental Divide; forested ecological systems are denoted by an asterisk:

- Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest*
- Rocky Mountain Mesic Montane Mixed Conifer Forest*
- Rocky Mountain Lower Montane, Foothill, and Valley Grassland
- Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland*
- Rocky Mountain Ponderosa Pine Woodland and Savanna*

Table 13 - Forested Big Game Winter Range Key Habitat Elements

Key Habitat Element	Function	How the element would be analyzed or conserved
Thermal cover	Vegetative cover, primarily used by deer and elk, that assists in maintaining homeothermy.	Structural definition, optimal amounts, and analysis area would be defined at property or project level.
Snow intercept	Canopy cover that, during periods of deep snow, reduces snow depths and decreases energy demands of locomotion.	Structural definition, optimal amounts, and analysis area would be defined at property or project level.
Hiding cover	Allows big game to use areas for bedding, foraging, thermal relief, wallowing, and other functions year-round. May contribute to security but does not necessarily provide security during hunting season.	Defined as vegetation capable of hiding 90% a big game animal at a site distance equal to or less than 200 feet. Optimum amounts and analysis area would be defined at the property or project level.
Security areas	Any area that will hold big game because of its geography, topography, vegetation, or a combination of these features.	Structural definition, optimal amounts, and analysis areas would be defined at the property or project level. For elk, concepts from the "Hillis paradigm" (Hillis et al. 1991) and "Security areas for elk during archery and rifle hunting seasons" (Ranglack et al. 2007) would be applied, if applicable.
Daily movement corridors	Allows big game to move from bedding to feeding areas.	Structural definition, optimal amounts, and analysis areas would be defined at the property or project level.

Key Habitat Element	Function	How the element would be analyzed or conserved
Forage	Vegetation including but not limited to forest understory grasses, forbs, shrubs, and trees as well as lichens, mosses, fruits, seeds, and roots that provides nutrition to wildlife year-round.	The potential forage species depends on the potential vegetation community. Important forage species would be identified and optimal amounts, quantity, quality, and analysis area would be identified at the property or project level.

Upper Elevation Montane Forest Key Habitat Elements

There is likely some overlap with this ecological setting and both the Mountain Foothills Big Game Winter Range and Forested Big Game Winter Range ecological settings, however this ecological setting is generally higher in elevation. Winter conditions in this ecological setting are generally too harsh for deer and elk and this setting is more commonly used as summer or fall range. Moose make use of this ecological setting in the winter. Upper Elevation Montane Forests serve multiple priority functions that relate to the original purpose for acquisition as well as targeted wildlife and fish benefits. Key habitat elements will vary based on habitat management priorities.

Elk general range in upper montane areas (excluding plains, valley bottom, and foothills distribution) corresponds well with this ecological setting. Using the elk general range distribution dataset maintained by FWP; removing the plains, valley bottom, and foothills areas; elk general range is commonly associated with the following ecological systems (based on NatureServe's classifications) listed below. This is provided only as an example of the potential vegetation communities associated with the Upper Elevation Montane Forest Ecological Setting. The list is ordered by the top 8 ecological systems which account for approximately 67% of ecological systems commonly associated with elk general range in upper montane areas; forested ecological systems are denoted by an asterisk:

- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland*
- Rocky Mountain Lodgepole Pine Forest*
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland*
- Rocky Mountain Montane Douglas-fir Forest and Woodland*
- Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest*
- Montane Sagebrush Steppe
- Recently burned forest*
- Rocky Mountain Mesic Montane Mixed Conifer Forest*

Table 14 - Upper Elevation Montane Forest Key Habitat Elements

Key Habitat Element	Function	How the element would be analyzed or conserved
Hiding cover	Allows big game to use areas for bedding, foraging, thermal relief, wallowing, and other functions year-round. May contribute to security but does not provide security during hunting season.	Defined as vegetation capable of hiding 90% a big game animal at a site distance equal to or less than 200 feet. Optimum amounts and analysis area would be defined at the property or project level.
Security areas	Any area that will hold big game because of its geography, topography, vegetation, or a combination of these features.	Concepts from the "Hillis paradigm" (Hillis et al. 1991) and "U.S. Forest Service and Montana Department of Fish Wildlife and Parks Collaborative Overview and Recommendations for Elk Habitat Management on the Custer, Gallatin, Helena, and Lewis and Clark National Forests" (MDFWP and USDA Forest Service 2013) would be applied. Definitions, optimal amounts, and analysis area would be defined at the property or project level.
Migratory travel corridors	Depends on species but generally allows wildlife to move between seasonal habitats for survival and reproduction.	Structural definition, optimal amounts, and analysis areas would be defined at the property or project level.
Furbearer habitat	Depends on species but generally is the habitat required by beaver, otter, muskrat, mink, marten, fisher, wolverine, bobcat, and lynx.	Would be analyzed from a fine filter approach driven by targeted wildlife species on the WMA.
Summer/Fall habitat	The habitat that accommodates big game use during the spring, summer, and/or fall.	Generally, it is the combination of thermal cover, hiding cover, forage and security areas. Structural definition, optimal amounts, and analysis areas would be defined at the property or project level.

Key Habitat Element	Function	How the element would be analyzed or conserved
Forage	Vegetation including but not limited to forest understory grasses, forbs, shrubs, and trees as well as lichens, mosses, fruits, seeds, and roots that provides nutrition to wildlife year-round.	The potential forage species depends on the potential vegetation community. Important forage species would be identified and optimal amounts, quantity, quality, and analysis area would be identified at the property or project level. For elk, recommendations from "Evaluating elk summer resource selection and applications to summer range habitat management" (Ranglack et al 2016) would be applied, if applicable.

Riparian Forests Key Habitat Elements

See "Key Habitat Elements Common to Most Ecological Settings" above.

Juniper Woodlands Key Habitat Elements

Juniper woodlands are important habitat for wildlife because adjacent grassland habitats lack vegetation structure (Sieg 1991a). Greater vertical structure increases species richness and density of passerine birds (Willson 1974, Roth 1976, Rotenberry and Weins 1980). Juniper woodlands provide habitat necessary for existence of many bird species on the northern Great Plains (Sieg 1991a,b). Juniper woodlands are also important for mammals. Some species of small mammals occur in greater abundance in juniper woodlands in the northern Great Plains (MacCraken et al. 1985a,b; Sieg 1988). Juniper woodlands are important habitats for mule deer (Severson and Carter 1978). Biologists call species like juniper "ice cream plants," meaning that they are beneficial and consumed when convenient, but are not essential as food for wintering ungulates. The relative importance of forage species varies from place to place, depending on the menu that is available (FWP 2017).

This ecological setting occurs primarily east of the Continental Divide in scattered stands associated with the Missouri River basin, in foothill and lower montane zones, island mountain ranges, and on escarpments extending out to the western Great Plains grasslands. Common ecological systems (based on NatureServe's classifications) associated with this ecological setting are listed below. This is provided as an example of the potential vegetation communities associated with the Juniper Woodlands Ecological Setting, which include:

- Rocky Mountain Foothill Limber Pine - Juniper Woodland
- Rocky Mountain Lower Montane-Foothill Shrubland
- Big Sagebrush Shrubland

- Great Plains Wooded Draw and Ravine

Table 15 - Juniper Woodlands Key Habitat Elements

Key Habitat Element	Function	How the element would be analyzed or conserved
Big-game hiding cover	Allows big game to use areas for bedding, foraging, thermal relief, wallowing, and other functions year-round. May contribute to security but does not provide security during hunting season.	Defined as vegetation capable of hiding 90% a big game animal at a site distance equal to or less than 200 feet. Optimum amounts and analysis area would be defined at the property or project level.
Habitat diversity	Trees provide vegetation structure that is otherwise lacking, thereby providing a diversity of habitat niches such as food and cover.	Guidelines for how forests would be managed for habitat diversity would be developed at the property or project level.
Non-game bird emphasis	Bird community patterns are associated with vegetation structural diversity (Roth 1976, Rotenberry and Wiens 1980, Sabo and Holmes 1983). Bird occurrence and abundance in juniper woodlands is greater than in prairie grasslands (Sieg 1991a) and varies with seral stages. More tree nesting birds are present in juniper woodlands than birds in other nesting guilds due to the vegetation structure provided by the tree canopy. Ground-nesting species that use trees for perches or feeding also benefit from juniper woodlands.	Generally a fine filter approach would be applied and guidelines for how forests would be managed for non-game bird emphasis would be developed at the property or project level.

3.1.3 Fine Filter Analysis

The fine filter analysis focuses on priority species that are not adequately addressed through the coarse and mesofilter approach. Conducting a fine filter analysis would be accomplished through several steps.

1. Identify the analysis area

The analysis area would be identified either based on the FWP property for which a property-specific forest management plan is being developed or by a project area being proposed for a forest management activity.

2. Identify priority species that have the potential to occur within or adjacent to the analysis area

- The Species of Greatest Conservation Need (SGCN) list in Montana's State Wildlife Action Plan (SWAP, FWP 2015a) would be used to query the Montana Natural Heritage Program (MNHP) database of SGCN species occurrences.

- Other priority species will be identified based on the rationale for acquiring the property and/or local expertise.
- Identify the Ecological Systems (MNHP) within the analysis area and use the list of "Native Species Commonly Associated with this Ecological System" to identify species that are listed as SGCN or other priority species that are likely to occur.
- MNHP predictive distribution models, or other available predictive distribution or occupancy models, will be used to identify SGCN or other priority species that are likely to occur, based on the available data.
- Consult the appropriate FWP wildlife biologist for information on SGCN or other priority species requiring fine filter analysis.

3. Identify habitat and habitat elements for species identified in Step 2

The Montana SWAP, MNHP field guide, scientific literature, and consultation with the appropriate FWP wildlife biologist are sources of information that can be used to identify habitat and habitat elements. required by SGCN or other priority species. In many cases, scientific results regarding habitat needs of SGCN or other priority species are not available. In these cases, expert opinion will be used to identify habitat elements for DFCs, and scientific results will be subsequently incorporated as they become available.

4. Determine if the species is adequately addressed by the coarse or mesofilter approach

The DFCs developed for conserving habitat and habitat elements resulting from the coarse and mesofilter analysis may be adequate for conserving some or all the species identified thus far in fine filter analysis. If this is determined not to be the case, then proceed to step 5.

5. Develop conservation measures to protect or enhance habitat for priority species

Conservation measures would be identified and implemented based on scientific literature, expert opinion, and/or FWP wildlife biologist recommendations.

3.1.4 Special Management Areas

Special Management Areas are areas on FWP forested land where the filter approach, either wholly or in part, does not provide for the desired uses, services, or outputs. The following site-specific issues would be used to guide the development of DFCs, or modify those developed through the filter approach.

FWP Sites with Less Than 50 Contiguous Acres of Forest

At the time of writing this plan there are 95 FWP sites with less than 50 acres of contiguous forest. The legislature directed FWP to give priority to "forested lands in excess of 50 contiguous acres…" (§ 87-1-201(9)(a)(iv), MCA). It may be impractical to thoroughly analyze FWP forested lands using the filter approach to develop DFCs. Managers have discretion to develop DFCs for sites with less than 50

contiguous acres of forested land based on site-specific objectives (some of which are described in this Special Management Areas section).

Wildland Urban Interface

FWP's forest management legislation; in § 87-1-201(9)(a)(iv), MCA, specifically directs the department to address fire mitigation. This is especially of concern in the wildland urban interface (WUI) where human development adjoins undeveloped wildlands and wildfires could threaten lives, homes, and private property. In § 76-13-102(16), MCA, WUI is defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

In property-specific forest management plans or projects, the WUI area overlapping an FWP property would be identified. This can be done by consulting Community Wildfire Protection Plans (CWPP) which are available online at: http://dnrc.mt.gov/divisions/forestry/fire-and-aviation/cwpps, contacting the appropriate county office, contacting the DNRC area office in which the FWP property resides, and/or contacting the entity responsible for fire protection on FWP property.

The next step will be to identify areas that have been designated as priorities in the WUI and develop objectives for the priority areas; balancing WUI objectives with the FWP property objectives, to the extent practicable.

Public Safety and Hazard Tree Management

Within and adjacent to campsites and developed public day-use sites, forests would be managed for hazard tree mitigation and wind firmness. These sites may include, but are not limited to: developed campsites, trails, parking areas, boat launches, buildings, and other structures maintained for public use. FWP maintenance staff and site managers routinely address and remove individual trees that pose immediate threats to public safety. Addressing these immediate threats is outside the scope of this plan. In this plan, the management strategy for these Special Management Areas are to manage forests for long-term safety by managing at the individual tree and/or stand level for site-appropriate species, size and age, density and stand structure, insect and disease resistance, wind firmness, and other factors. These factors would be evaluated when developing property-specific forest management plans and projects. FWP's Region One Hazard Tree and Forest Management Environmental Assessment (FWP 2003) can be used as a guide, although may not be applicable to sites east of the Continental Divide.

FWP Infrastructure

Within FWP's forested land, there is a variety of developed and/or maintained infrastructure. These include fences, signs, roads (and associated road features such as bridges, culverts, cattleguards, etc.), trails, parking areas, boat launches, developed campsites, buildings, and other features. Within and adjacent to these features, desired future conditions may be guided by maintenance, safety, access, and/or fire hazards concerns. During the property-specific or project planning process, infrastructure features will be identified and managers will determine what specific management objectives for forested lands within and adjacent to infrastructure are needed.

Cultural/archeological Sites

There are a variety of natural, cultural, and archaeological sites occurring on FWP forested lands. The trees themselves may be the primary attraction at a site, such as at the Big Pine FAS near Alberton, MT. Similar to infrastructure, FWP invests a significant amount of time and resources on the development and maintenance of many of these sites. These sites would be identified in property-specific management plans and projects. Managers, in consultation with the staff archaeologist or State Historic Preservation Office (SHPO), would determine site-specific management objectives for forests within and adjacent to these sites. Consultation with Native American tribes and/or the SHPO for a file or field review may be needed to identify these sites.

Aesthetic Value

Aesthetic values include how people sense and judge their surroundings. The visual and auditory conditions are commonly important considerations. Visual appearance is often dependent on the observation point and various visibility ranges (such as foreground – approximately 0 to 0.5 miles, middleground – approximately 0.5 to 4.0 miles, and background – approximately 4 miles and beyond). Similarly, noise and sound levels depend on the observation point and varying distance from that point.

Where Special Management Areas have been identified for the purpose of enhancing or protecting aesthetic values, property-specific forest management plans and projects would identify DFCs based on the visual, auditory, and/or other applicable aesthetic values. Examples of this are maintaining or enhancing visual screening between campsites, facilities, neighboring private lands and residences, or the vegetation buffering a campsite from the noise of a nearby highway. This can be considered both from within a site or how the site is viewed from the outside, such as from a resort or rest area along the highway.

3.2 Management Actions to Achieve Desired Future Conditions

Section 3.1 provided the steps for conducting the filter analysis and identifying Special Management Areas which, depending on the size or complexity of the site, may have many potential DFCs identified pertinent to many different forest resources. This section provides direction on how DFC's can be achieved through forest management. Opportunities for FWP to achieve DFCs include active management as well as passive management (e.g. monitoring).

3.2.1 Prioritizing Desired Future Conditions

There are several questions that should be addressed in order to prioritize between multiple DFCs. These are not the only questions, but they are the minimum that should be considered by managers. Ultimately managers will need to determine which actions will best achieve DFCs. There are several software and GIS tools that can be used to integrate multiple variables and simulate conditions into the future to optimize planning priorities. At the time of writing this plan, FWP acknowledges that available time and resources may be a limitation in conducting these kinds of simulations. Prioritization will largely be determined by relying on the expertise of FWP's managers, making the best use of these tools as possible.

- Are there potential vegetation communities or successional stages that are underrepresented/overrepresented on the landscape, as determined by comparison of current proportions to proportions represented by the reference conditions?
- Are current patch sizes, shapes, and arrangements of vegetation communities and successional stages similar to/different from reference condition patch variation?
- What levels of key habitat elements would best contribute to providing effective wildlife habitat for targeted species and are current levels sufficient?
- What are the tradeoffs of increasing/sustaining higher levels of one key habitat element at the expense of other elements?
- Are the levels of key habitat elements sufficient to support other priority species that occur or have the potential to occur in the area?
- Are there species or desired outputs that would be favored in the future but are not currently provided?
- Are there species or desired outputs that only occur or are provided for on an FWP site?
- Are there Special Management Areas or overriding laws, rules, plans, or agreements directing alternate DFCs?
- Are there social/economic pressures to manage for a different DFC?
- Are there opportunities to achieve DFCs by working with other ownerships?

Answering these questions, or turning these questions into statements, will help prioritize needs for implementing actions to achieve DFCs.

3.2.2 Property Specific Forest Management Plans and Developing Forest Management Projects

A property-specific forest management plan or forest management project will identify actions that can be implemented to achieve DFCs for individual FWP sites using the direction provided in this programmatic plan. Property-specific forest management plans will use the guidance provided in this programmatic plan to evaluate current conditions, develop DFCs, identify actions (including passive management actions) that can be implemented to achieve DFCs, prescribe treatments (if warranted) that move forests toward DFCs, and monitoring that will be conducted to track progress towards achieving DFCs.

Forest management projects are either applied to a specified area, as directed in a property-specific forest management plan, or are identified as a priority by managers in lieu of a plan. In the case of the latter, it is recognized that most sites do not currently have a property-specific forest management plan so forest management projects would be developed using the guidance of this programmatic plan until a property-specific forest management plan is completed.

In accordance with § 87-1-201(9)(a)(iv), MCA, managers should give priority to forested lands in excess of 50 contiguous acres for completing property-specific forest management plans. Managers have discretion in completing property-specific forest management plans for properties with less 50 contiguous acres of forested land depending on site-specific priorities.

3.2.3 Inventory - Current Conditions

As mentioned in Section 3.1.1 - Coarse Filter Analysis, FWP has a forest stand layer geodatabase. In addition, there are several other sources of information on current conditions that are readily available, such as remotely-sensed GIS data. FWP's forest stand layer geodatabase is a stand based inventory system containing information on several forest attributes that would be used to conduct the filter analysis.

In accordance with § 87-1-201(9)(a)(iv), MCA, managers should give priority to forested lands in excess of 50 contiguous acres for collecting and maintaining forest inventory data in the FWP forest stand layer geodatabase. Managers have discretion in completing forest inventories for properties with less 50 contiguous acres of forested land depending on site-specific priorities.

As part of the process of developing a property-specific forest management plan or forest management project, a forest inventory should be conducted and the forest stand layer geodatabase attributes should be populated with data to be used for analysis and for future monitoring to track changes to forest attributes over time. FWP anticipates that it will take several years, if not decades, to conduct inventories of its forested lands, although continual technological advances may facilitate and shorten the timeframe for collecting such data.

3.2.4 Silvicultural Prescriptions

Silvicultural prescriptions are a planned series of treatments that would be implemented to achieve and/or maintain stands within the range of DFCs. Silvicultural prescriptions should be developed for stands (or stands can be grouped/stratified for larger properties, if desired) in property-specific forest management plans or for stands being proposed for forest management projects. Silvicultural prescriptions may not be developed for some stands or properties that are being passively managed.

Guidelines for Writing Silvicultural Prescriptions

Silvicultural prescriptions should contain the following information:

- A stand description should preface the silvicultural prescription. Stand descriptions should include basic information (such as attribute data stored in the FWP forest stand layer geodatabase) and a narrative on the current conditions, disturbance regime, and the role forest succession and disturbance history (including human-caused disturbance) played in the development of the current stand conditions.
- Management objectives should be clearly identified, referencing DFCs developed for the property or project area.
- Silvicultural system and prescription – use terms consistent with Society of American Foresters Silviculture Terminology (SAF 1994). This may not always be applicable, for example when treatments are being applied to areas that were formerly non-forested (e.g. grasslands or shrublands).

- Treatment method(s) – identify treatment methods that would be applied such as planting, hand cutting, prescribed burning, mechanized treatment (if timber harvest, identify harvesting system), etc.
- Regeneration method(s) – if regeneration is an objective, identify whether it will be natural, artificial, or not applicable
- Slash treatment and site preparation – identify and describe treatments, if applicable
- Schedule of treatments – identify a timeline for treatments and monitoring

Describing Current Conditions and DFCs

1. Use succession classes (SCLASS) to establish DFCs when the objective is to move stands towards reference conditions (adapted from Barrett et al. 2010). SCLASS provides a consistent way of comparing current conditions, reference conditions, and establishing DFCs.

    - **Early-seral, post-replacement** – single layer; post-replacement response shrubs, graminoids, and/or forbs; standing dead and down; and/or regenerated stands typically less than 30 years old
    - **Mid-seral, closed canopy** – one to two upper layer size classes; >35% canopy cover (crown closure estimate); and typically greater than 30 years old up to 100+ years old
    - **Mid-seral, open canopy** – one to two upper layer size classes; <35% canopy cover (crown closure estimate); and typically greater than 30 years old up to 100+ years old
    - **Late-seral, open canopy** – One to three size classes in upper canopy layer; <35% canopy closure (crown closure estimate); and typically greater than 100 years
    - **Late-seral, closed canopy** – One to multiple upper canopy tree layers; >35% canopy closure (crown closure estimate); and typically greater than 100 years

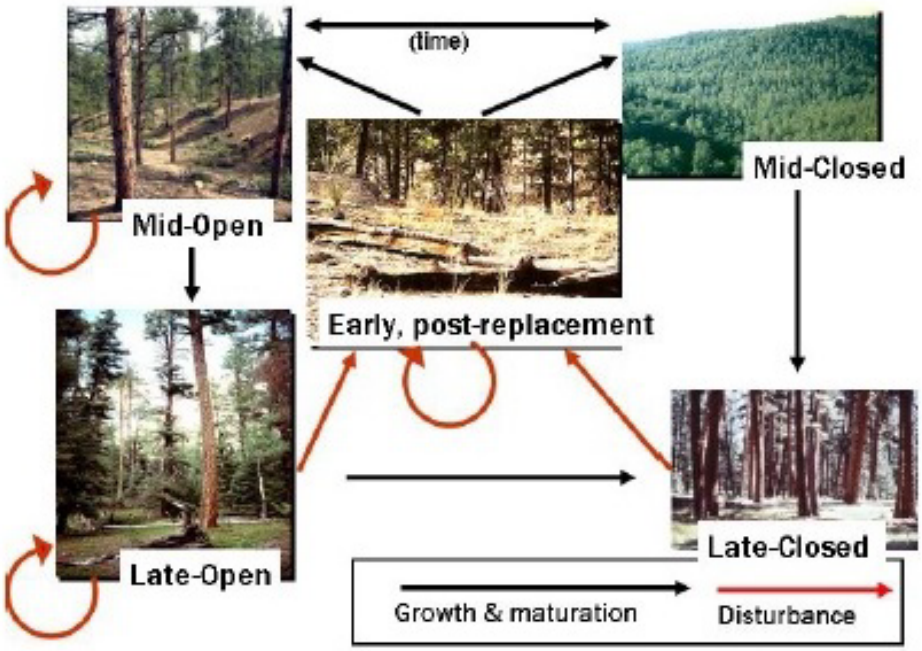


Figure 17 - Illustration of SCLASS used to compare current conditions to reference conditions (Barrett et al. 2010)

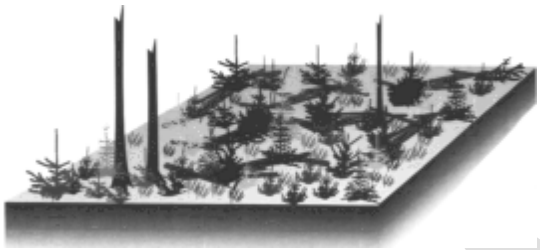
Describe DFCs for key habitat elements in structural terms, if possible and/or applicable

1. Structure terminology (adapted from O'Hara et al. 1996). In many cases, structure can be correlated to certain habitat elements. For example, the closed stem exclusion structure class may provide effective thermal cover and snow intercept. These structure classes use the terms cohorts and individuals to refer to trees but FWP would also manage for structures based on influencing the quantity and/or quality of various grasses, forbs, and shrubs.

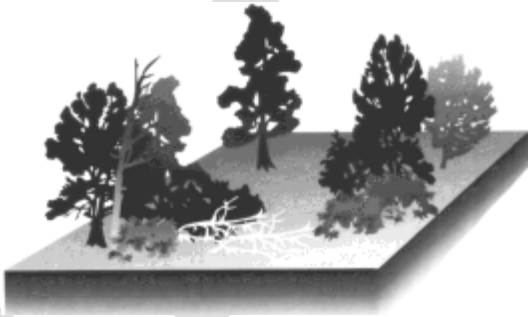
    - **Grass/forb or shrublands** – The dominant vegetation is herbaceous (grasses and forbs), shrublands, or mixed grasslands/shrublands
    - **Stand Initiation** – Growing space is reoccupied following stand replacing disturbance. One canopy stratum (may be broken or continuous); one cohort of seedlings or saplings; grass, forbs, shrubs may also be present.
    - **Open Stem Exclusion** – Underground competition limits establishment of new individuals. One broken canopy stratum which includes poles or smaller trees; grasses, shrubs, and forbs may also be present.
    - **Closed Stem Exclusion** – New individuals are excluded through light or underground competition. Continuous closed canopy, usually one cohort; poles, small or medium sized trees present; and suppressed trees, grasses, shrubs, and forbs may be absent in some cover types.
    - **Understory Reinitiation** – Initiation of new cohort as older cohort occupies less than full growing space. Broken overstory canopy with formation of understory stratum; two or more cohorts; overstory may be poles or larger trees; understory is seedlings, saplings, grasses, forbs, and/or shrubs.
    - **Young Mulit-Strata** – Two or more cohorts present through establishment after periodic disturbances including harvest events. Multi-aged (multi-cohort) stand with assortment of tree

sizes and canopy strata present but very large trees absent. Grasses, forbs, and shrubs may be present.

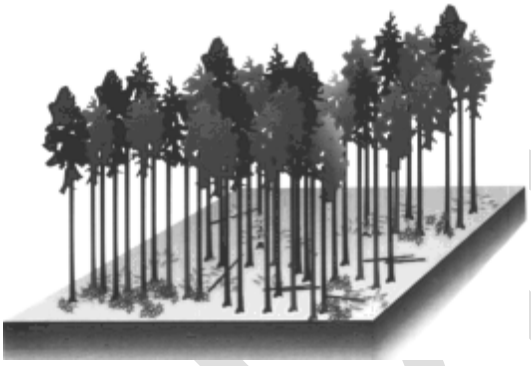
- **Old Forest, Mulit-Strata** – Two or more cohorts and strata present including large, old trees. Multi-aged stand with assortment of tree sizes and canopy strata present including large, old trees.
- **Old Forest, Single Strata** – Single stratum of medium to large, old trees of one or more cohorts. Structure maintained through nonlethal burning or management. Broken or continuous canopy of medium to large, old trees. Single or multi-cohort. Understory absent or consisting of some seedlings, saplings, grasses, forbs, or shrubs.



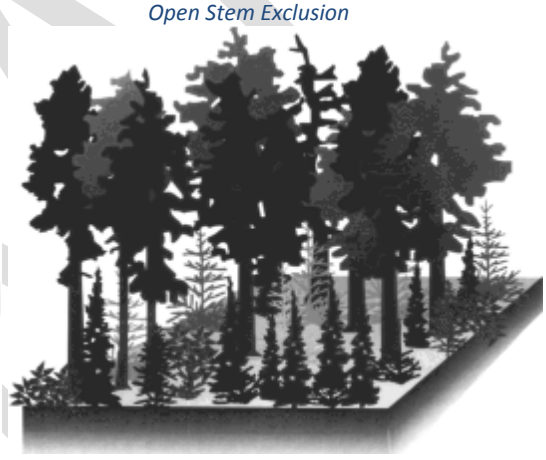
Stand Initiation



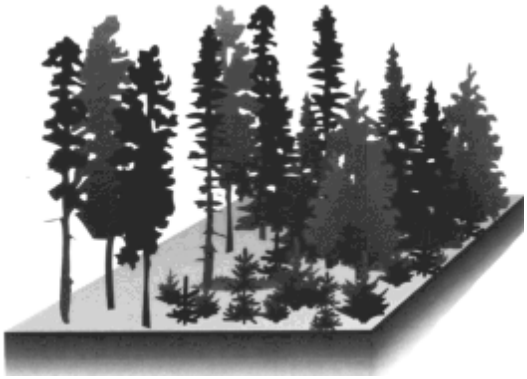
Open Stem Exclusion



Closed Stem Exclusion

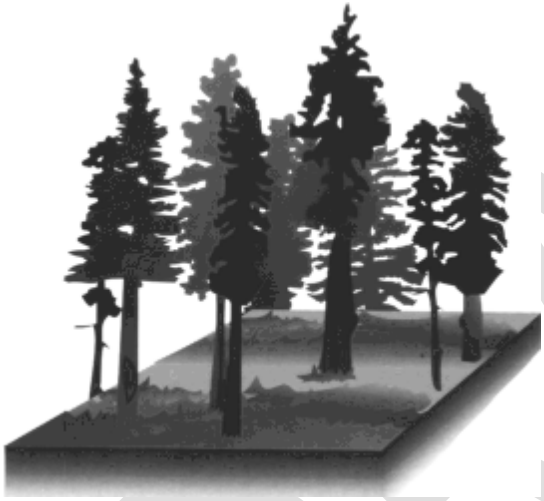


Understory Reinitiation



Young Multi-Strata

Old Forest, Multi-Strata



Old Forest, Single-Strata

Illustrations of structure classes were copied from O'Hara et al. 1996

Selecting Appropriate Silvicultural Systems

1. Silvicultural systems for emulating historic disturbance regimes (based on reference conditions).

Table 16 - Appropriate Silvicultural Systems for Emulating Historic Disturbance Regimes

Historic Disturbance Regime	Appropriate Silvicultural System	Potential Prescriptions	Other considerations
Low/mixed severity – generally less than 25% reduction in canopy coverage of the dominant overstory Frequent – 0 to 35 years	Uneven-aged	Thin from below, group selection, single-tree selection	May be mixed with non-forest (grassland/shrublands), topography (slope, aspect, microsites) may dictate density and clumpiness, patch sizes generally smaller and irregular, favor retention of seral (shade intolerant and frequent-fire adapted) species, favor more large trees, favor development of late successional/open canopy stands and fewer early- to mid-successional/closed canopy stands
Mixed severity – generally 25 to 75% reduction in canopy coverage of the dominant overstory, can include low severity Frequent – 0 to 35 years	Uneven-aged, two-aged	Thin from below, crown thinning, group selection, single-tree selection, shelterwood with reserves, seed tree with reserves, and intermediate treatments[1]	Elevation-wise may be in between low/mixed and stand replacement regimes, aspect-wise may be on north to east aspects bordering low/mixed regime, generally more productive (more fuel) than the low/mixed regime, influenced by topography (slope, aspect, draws, riparian areas) and microclimate, sites capable of supporting more shade tolerant species will create the potential for more/larger openings due to tendency towards ladder fuel development, openings vary in size, favor retention of seral (shade intolerant and fire resistant) species, favor a mix of different successional stages/age classes/species composition/patch sizes/canopy closure

Historic Disturbance Regime	Appropriate Silvicultural System	Potential Prescriptions	Other considerations
Mixed severity – generally 25 to 75% reduction in canopy coverage of the dominant overstory, can include low severity Infrequent – 35 to 200 years	Uneven-aged, two-aged, even-aged	Thin from below, crown thinning, group selection, single tree selection, shelterwood with reserves, seed tree with reserves, clearcutting with reserves, shelterwood, seed tree, clearcutting, and intermediate treatments[1]	Generally mid to upper elevation and/or high productivity forests, disturbances (especially fire) do not frequently occur on a significant scale due to climatic conditions and/or the nature of the vegetation community and site, more frequent fires would tend to be smaller and/or result in less overstory reduction, less frequent fires would tend to result in larger openings and greater reduction in overstory canopy coverage, favor seral (shade intolerant and fire resistant) species, favor a mix of different successional stages/age classes/species composition/patch sizes/canopy closure, openings will be larger than in the mixed severity/frequent regime
Stand replacement – generally greater than 75% canopy coverage reduction of the dominant overstory Infrequent – 200 plus years	Two-aged, Even-aged	Shelterwood with reserves, seed tree with reserves, clearcutting with reserves, shelterwood, seed tree, clearcutting, and intermediate treatments[1]	Generally mid to upper elevation forests, species composition usually represented by fewer species and with fewer species present that are adapted to frequent fires, a single species and age class may dominate all stages of succession, homogenous conditions within stands; forms mosaics of different age-classes on the landscape, patch sizes can vary substantially with some becoming quite large (tens to hundreds of thousands of acres) when conditions are favorable for disturbance epidemics/outbreaks.

[1]*Intermediate treatments may be applied in most silvicultural systems and include treatments such as salvage, sanitation, thinning, cleaning, improvement cutting, and/or prescribed burning.*

- Silvicultural Systems

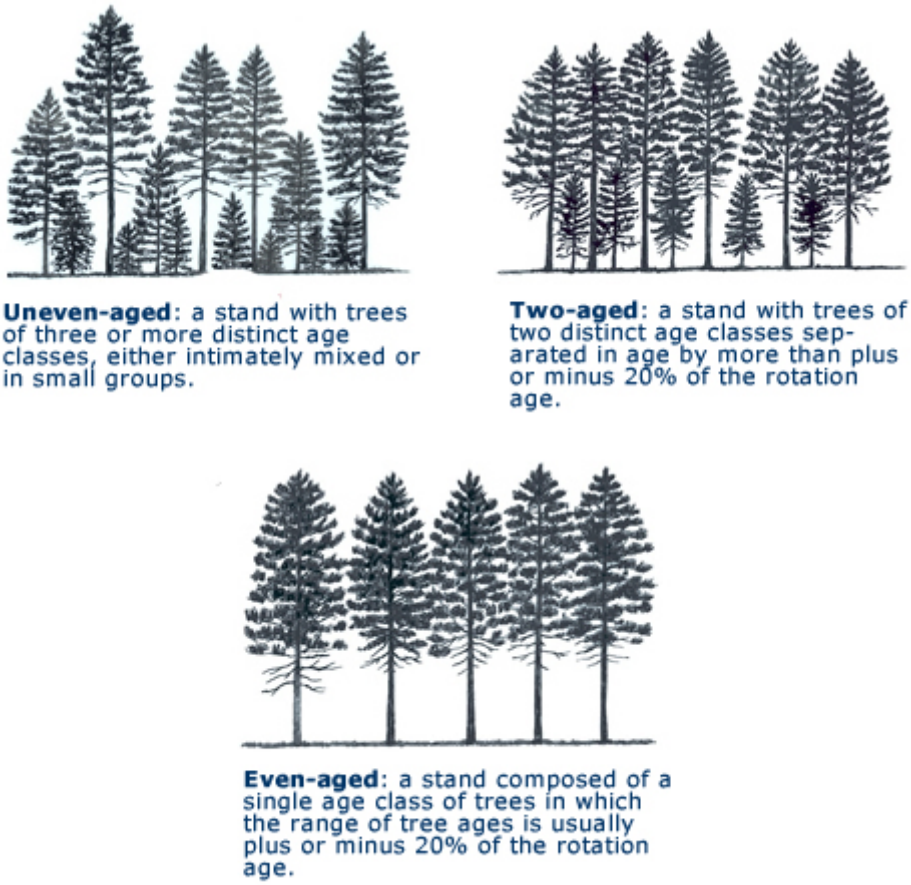


Figure 18 – Illustration of silvicultural systems commonly used when writing silvicultural prescriptions.

- Uneven-aged Systems

Figure 19 - Illustration of a group selection treatment used in an uneven-aged silvicultural system

Figure 20 - Illustration of a single tree selection treatment used in an uneven-aged silvicultural system

- Even-aged or two-aged systems

Figure 21 - Illustration of a shelterwood treatment used in an even-aged or two-aged silvicultural system

Figure 22 - Illustration of a seed tree treatment used in an even-aged or two-aged silvicultural system

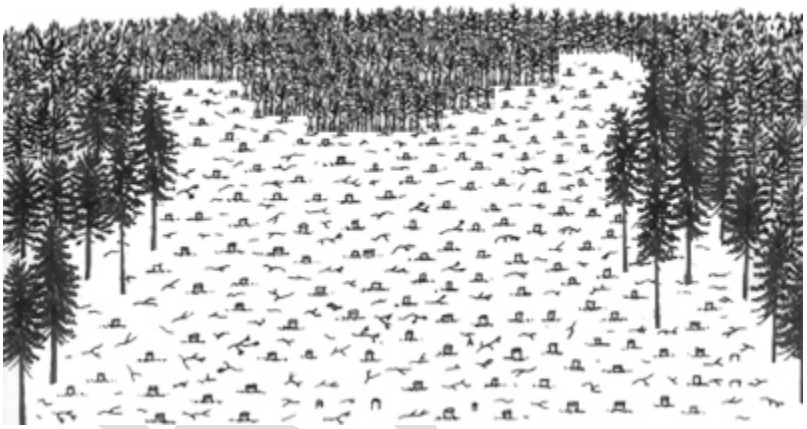


Figure 23 - Illustration of a clearcut treatment used in an even-aged silvicultural system

Figure 18-23 were provided by the USDA Forest Service – Northern Research Station

2. Other appropriate silvicultural prescriptions

There will be many DFCs aimed at managing key habitat elements, priority species, and/or Special Management Areas. Although these will occur in stands that can be classified into a historic disturbance regime and therefore into a silvicultural system (as in the Table 16), often the prescribed treatments will be focused on promoting or modifying specific stand attributes rather than emulating the historic disturbance regime. Examples of these prescriptions (using SAF Silviculture Terminology) include, but are not limited to:

- Afforestation – establishment of a forest or stand in an area not recently forested
- Artificial regeneration – an age class created by direct seeding or by planting seedlings or cuttings

- Cleaning (weeding) - a release treatment made in an age class not past the sapling stage in order to free the favored trees (or other desirable vegetation) from less desirable individuals (vegetation) of the same age class that overtop them or are likely to do so
- Forest fertilization – the addition of nutrient elements to increase growth rate or overcome a nutrient deficiency in the soil
- Fuel treatment – any manipulation or removal of wildland fuels to reduce the likelihood of ignition or to lessen potential damage and resistance to control.
- Improvement cutting – a cutting made in a stand pole-sized or larger primarily to improve composition and quality (of desirable trees or other vegetation) by removing less desirable trees of any species
- Intermediate treatments – a collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest
- Precommercial Thinning (PCT) – a thinning that does not yield trees of commercial value, usually designed to reduce stocking in order to concentrate growth on the more desirable trees.
- Prescribed burning – the application of fire, usually under existing stands and under specified conditions of weather and fuel moisture, in order to attain silvicultural or other management objectives
    - Including but not limited to: pile burning, jackpot burning, broadcast burning
- Pruning – The removal of side branches and multiple leaders of a standing to tree to improve timber, aesthetics, or health.
- Reforestation – the natural or artificial restocking of an area with trees
- Salvage cutting – the removal of dead trees or trees being damaged or dying due to injurious agents other than competition, to recover [commercial] value that would otherwise be lost.
- Sanitation cutting – the removal of trees to improve stand health by stopping or reducing actual or anticipated spread of insects and disease
- Scarification – mechanical removal of competing vegetation and/or interfering debris, or disturbance of the soil surface, designed to enhance reforestation
- Site preparation – a hand or mechanized manipulation of a site designed to enhance the success of regeneration. Treatments may include bedding, burning, chemical spraying, chopping, disking, drainage, raking, and scarifying. All treatments are designed to modify the soil, litter, and vegetation and to create microclimate conditions conducive to the establishment and growth of desired species.
- Stand improvement – a term comprising all intermediate cuttings made to improve the composition, structure, condition, health, and growth of even- or uneven-aged stands
- Thinning - a cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality.
    - Crown thinning (thinning from above, high thinning) – The removal of trees from the dominant and codominant crown classes in order to favor the best trees of those same crown classes.

- Free thinning – The removal of trees to control stand spacing and favor desired trees using a combination of thinning criteria without regard to crown position.
- Low Thinning (Thinning from Below) – The removal of trees from the lower crown classes to favor those in the upper crown classes.
- Mechanical Thinning (Geometric Thinning) – The thinning of trees in either even- or uneven-aged stands involving removal of trees in rows, strips, or by using fixed spacing intervals.
- Selection Thinning (Dominant Thinning) – The removal of trees in the dominant crown class in order to favor the lower crown classes.

3.2.5 Landscape Management and Cooperative Planning

The forest management approach presented in this plan provides a process for evaluating conditions at a landscape level and at the FWP property level. Both the filter approach and some components of Special Management Areas require evaluating conditions beyond the FWP property line. In some cases, neighboring landowners may be taking (or willing to take) a similar approach and cooperative planning can benefit FWP and its neighbors. FWP will make reasonable efforts to pursue cooperative planning and management opportunities with our neighbors (both private and public landowners) as well as with partnering agencies and organizations. Cooperative planning has the potential to save money, time, provide access to data, identify project opportunities, result in plans and projects that are more effective in restoring/maintaining ecological integrity and/or providing habitat elements for targeted species, more effectively conserve habitat for priority species, protect and/or enhance important resources and values, and/or provide greater public use opportunities.

3.3 Management Tools to Achieve Desired Future Conditions

Once management actions have been identified and silvicultural prescriptions have been written, it is important to select the right tool for the job. Forest management utilizes a variety of tools including passive management (such as monitoring) and active management which often involves manipulating vegetation to achieve DFCs. Tools commonly used include, but are not limited to:

<u>Mechanical treatment</u>

Mechanical treatments utilize heavy equipment to accomplish a variety of tasks. Many of these can tasks can be done in combination to achieve multiple objectives. Common mechanical treatments include:

- Timber Harvest (logging) – felling, skidding (including skyline and helicopter yarding), processing (delimbing and manufacturing trees into logs), and loading logs onto trucks for delivery to forest products manufacturing facilities
- Grinding, mastication, mechanical PCT – mechanically cutting or reducing the density of trees, downed woody debris, or other vegetation where the material is left on site either at the location it was cut, lopped and/or scattered in the stand, ground into wood chips (both in-woods and at central locations utilizing wood chippers or grinders), or piled for burning.

- Site preparation – see Section 3.2.4 Silvicultural Prescriptions
- Machine piling and slash disposal – mechanically piling logging residue or other woody vegetation for burning both in the woods and at central locations (such as along roads)
- Other mechanical – Can include a variety of treatments such as placing or manipulating coarse woody debris, reclamation of disturbed areas, constructing firebreaks and other fire-related activities using aerial or ground-based equipment, herbicides applied aerially or by ground-based equipment, etc.

Non-mechanical treatments

Treatments not requiring heavy equipment commonly include, but are not limited to:

- Reforestation – See Section 3.2.4 Silvicultural Prescriptions
- Fertilization – See Section 3.2.4 Silvicultural Prescriptions
- Herbicide – Application of chemicals to trees or forest vegetation.
- Hand cutting – Use of handheld cutting equipment for reducing the density of trees or other forest vegetation
- Girdling – Killing a tree or woody plant by cutting through the cambium around its entire circumference
- Prescribed burning - See Section 3.2.4 Silvicultural Prescriptions
- Other non-mechanical – Can include hand piling of woody debris for burning, hand fireline construction, seeding, etc.

Both mechanical and non-mechanical treatments have the potential to result in soil disturbance, displace wildlife and vegetation, increase noise and air pollution, and affect other resources. These disturbances will vary depending on the intensity and duration of the activity being implemented. In addition to conforming to all applicable laws and rules relating to these activities, standards and guidelines would be applied to minimize the effects on other resources. See Appendix C for a list of these standards and guidelines that would be applied when forest management activities are being implemented.

When projects are proposed that would implement mechanical or non-mechanical treatments they would undergo an internal approval process. This process varies depending on the type of activity being implemented. For example, a timber harvest project may require Commission approval while a project that implements hand-cutting of submerchantable conifers expanding in to grasslands may not. See Appendix A for an outline of the project approval process.

3.4 Selling Timber from FWP Lands, Forest Management Account, and Annual Sustained Yield

3.4.1 Selling Timber from FWP Lands

The Constitution of Montana established that "*No such land or any estate or interest therein shall be disposed of…until the full market value of the estate or interest disposed of, to be ascertained in such*

manner as may be provided by law, has been paid or safely secured to by the state." (Constitution of Montana – Article X – Education and Public Lands, § 11(2)). As such, timber is an interest in FWP land and therefore selling of timber is subject to this provision of the Constitution of Montana. The Fish and Wildlife Commission and State Parks Board would approve projects involving selling timber from FWP properties. Bidding and awarding contracts for the sale of timber would be conducted in accordance with state purchasing and procurement laws and rules. See Appendix A for more details on the project approval process.

3.4.2 Forest Management Account

In order to implement the forest management program, the Montana Legislature created a special revenue account called the Forest Management Account (§ 87-1-621, MCA). Each FWP Division has a separate Forest Management Account. Revenue generated from timber sales shall be deposited in this account and its use is limited to implementing the program, the provisions of this FWP Forest Management Plan, and for implementing forest management projects. Money generated from one FWP property can be used on another FWP property and does not remain attached to the FWP property in which it was generated. For the program to remain fiscally sustainable, timber sale revenue needs to exceed the cost of operating the program and implementing non-revenue generating forest management projects. Two-year and five-year plans identifying projects, potential budgets, and priorities will be developed based on funding availability. See Appendix A for more details about the project approval process.

3.4.3 Annual Sustained Yield

State law requires that FWP conduct a sustained yield study to determine the annual sustained yield of timber that can be harvested from forested lands. This study was completed in December 2013, and state law also requires the Commission and Board to review and redetermine the annual sustained yield at least every five (5) years. The management implications of the annual sustained yield requirement for this forest management plan are:

- The sustained yield calculation will be based on forested lands (owned by FWP) in excess of 50 contiguous acres in any State Park, Fishing Access Site, or Wildlife Management Area;
- The amount of timber sold may not exceed the annual sustained yield;
- The annual sustained yield shall be determined based on this FWP Forest Management Plan since this plan provides the framework and programmatic direction to implement § 87-1-201(9)(a)(iv), MCA and therefore is the "provisions" referred to in § 87-1-622(6)(a), MCA; and
- § 87-1-622(1), MCA requires that the Commission and Board adopt forest management plans based on an annual sustained yield, therefore timber sales (and consequently timber harvest) shall be a management tool FWP will use to achieve DFCs.
    - This plan establishes a process for determining DFCs for FWP forested lands but does not identify site-specific projects for implementing timber harvest. Therefore, managers will need to evaluate the feasibility of conducting a timber sale at the property-specific or project area level.

3.5 Monitoring and Reporting

Monitoring and reporting will occur at several levels. These levels include:

1. Program monitoring

- **Legislative reports** – As deemed necessary by FWP or Montana's Legislature, the Department will provide a report to the legislature summarizing work accomplished that relates to the statutory requirements of the forestry program. In order to produce this report, FWP will track projects by FWP Division, project name and location, acres treated, treatment methods, volume of timber harvested (if applicable), expense and income, completion dates, and any other pertinent information deemed necessary for the report.
- **Sustained Yield Updates** – As required by law, FWP will review and redetermine the annual sustained yield at least every five years. In order to accomplish this, FWP will track the information necessary to conduct this update. This information primarily includes: commercial forested acres available for harvest, timber volume on available acres, management constraints, and site productivity.
- **Forest Management Plan Review** – The forest management plan will be reviewed every 10 years, or sooner, if deemed necessary. The FWP Forester and a representative from each FWP Division will evaluate the plan's effectiveness and determine if there is a need for significant changes. If changes are warranted, they would be brought to the Commission and Board for approval in accordance with the Commission and Board process.

2. Property or project level monitoring

DFCs would be identified in the property-specific or project level plans and monitoring plans for tracking progress towards achieving DFCs shall also be identified. These monitoring plan shall include:

- **Coarse filter monitoring** – This monitoring focuses on ecological integrity and primarily concentrates on the landscape level (as determined by analysis areas identified in the coarse filter analysis). Using remotely sensed data (e.g. using photo interpretation to track changes in successional stage, patch size, etc.) is one source of information for monitoring progress towards achieving coarse filter DFCs. Updates would occur to FWP's forest stand layer geodatabase after treatments are implemented, following significant disturbance events, or after a period of time that succession has led to measurable changes; as another source of information for coarse filter monitoring. This information would be used to track how current conditions compare to reference conditions over space and time.
- **Mesofilter monitoring** – This monitoring focuses on key habitat elements. At the property-specific or project level, pre-monitoring (establishing current conditions) would be conducted and plans would provide DFCs for these key habitat elements. Based on those DFCs, the property-specific or project level forest management plan shall also provide a timeline for conducting post-monitoring for evaluating the effectiveness of implemented actions identified

in the plan. Common monitoring methods include regeneration surveys, stand exams (re-inventory), and photo point monitoring.

- **Fine filter monitoring** – This monitoring focuses on individual species or their required habitat elements. An FWP wildlife biologist would identify pre-monitoring and post-monitoring methods depending on the species of interest.
- **Special management areas** – FWP would identify criteria for pre- and post-project monitoring to evaluate and track progress towards achieving Special Management Area DFCs.

3. Implementation monitoring

This monitoring would focus on treatments being actively implemented and would occur prior to, during, and after implementation of a treatment. Monitoring plans for implementation monitoring would be developed and documented in either property-specific or project level forest management plans or in silvicultural prescriptions; or both. Common monitoring activities include (but are not limited to) contract inspection reports, equipment inspections, and Montana Forestry Best Management Practices (BMP) notifications.

4. Monitoring from other programs or organizations

FWP would utilize other on-going monitoring projects, when deemed necessary and appropriate, such as FWP's long-term vegetation monitoring or DNRC's statewide BMP monitoring reports.

3.6 Forest Management Plan Checklist

To ensure property-specific forest management plans and projects are developed in accordance with this plan and to maintain both internal and external accountability, a checklist is provided in Appendix B. This checklist will be completed for any property-specific forest management plan or forest management project.

4. PRIORITIES AND NEXT STEPS

The final chapter provides some guidance on what to do next with the programmatic direction and guidance provided in this plan. There are program priorities, which are internal program management needs such as tracking and coordinating projects and budgets, systems for consistently conducting the filter analysis, resources and personnel needed to implement the program, etc. There are also planning priorities, which are areas that managers should focus on and prioritize for developing plans and projects.

4.1 Program Priorities

Budget and Personnel

The legislature established the Forest Management Account (§87-1-621, MCA) to fund the forest management program and in 2015, authorized the FWP Wildlife Division to hire a forester to manage and implement the program. The capacity of the forest management program primarily depends on the budget available to operate the program and implement projects. This requires that short and long-term projects are planned to ensure fiscal sustainability.

Based on the current annual sustained yield, Table 17 provides potential income and expense scenarios and money that could be available annually for planning and implementing forest management projects based on the assumption that the annual sustained yield of timber (calculated in 2013 as 4,100 MBF per year) was sold. In the table, potential stumpage value is the value (in $/MBF) FWP could receive for its timber. The actual price FWP would receive will depend on a number factors such as market conditions when the timber is sold (what mills are willing to pay for timber), logging costs and hauling costs (which can vary depending on the logging system, fuel prices, production, haul distance, etc.), constraints imposed by FWP that affect logging and hauling cost, and other associated costs such as road work that would be needed to upgrade roads for handling log trucks and to meet BMPs. The program also has the capability of seeking alternative sources of funding for accomplishing this work, such as through grant programs, other FWP budgets, and through volunteer work; which could add capacity beyond funding from the Forest Management Account.

A board foot is a measure of volume equivalent to 1 inch thick by 12 inches wide by 12 inches tall. A standard 8-foot 2x4 (which is actually 1.5" thick by 3.5" wide) contains 3.5 board feet. Timber is often sold by the thousand board feet (MBF). On average, there are about 4.5 MBF on a standard log-truck load. FWP's annual sustained yield was estimated in 2013 to be 4,100 MBF which is roughly equivalent to 911 log truck loads per year.

Table 17 - Potential Income and Expense Scenarios

Potential Stumpage Value ($/MBF)	2013 Annual Sustained Yield Calculation (MBF)	Potential Annual Revenue ($)	Est. Annual Personnel and Operating Costs	Potential Budget Available Annually for Planning and Projects
$ 25	4,100	$ 102,500	$ 122,000	**$ -19,500**
$ 50		$ 205,000		**$ 83,000**
$ 100		$ 410,000		**$ 288,000**
$ 150		$ 615,000		**$ 493,000**
$ 200		$ 820,000		**$ 698,000**

The table provides an example of some potential scenarios; however the annual income and expenses will vary from year to year. In order to ensure fiscal sustainability, FWP would develop two-year and five-year project lists and budgets and implement projects accordingly, which will determine the actual capacity of the forest management program over-time.

System for conducting the filter analysis and monitoring

Chapter 3 described a process for conducting the filter analysis and/or identifying Special Management Areas in order to develop DFCs. This process involves using a variety of data sources and GIS analysis methods and ultimately results in the development of a plan and/or projects to achieve DFCs. Monitoring would then occur to track progress toward DFCs. Ideally this process will be conducted consistently across FWP's forest management program. While it is important to remain flexible enough to participate in cooperative planning and projects, it is also important for FWP to have control over evaluating current conditions, establishing DFCs, and monitoring results. In order to do this, FWP would need to develop a system and a document (such as a handbook) that establishes protocols and procedures for: utilizing external data sources, maintaining and collecting data in FWP's inventory database, data collection, data analysis, updating and editing data, and monitoring.

Resources to implement plans and projects

As of April 2017, there are 170 forested sites under the purview of FWP's forest management program. There are approximately 508 air-miles between West Kootenai WMA and Makoshika SP and it would take approximately 11 hours and 30 minutes to drive non-stop between them by car. Over time, it is likely that multiple projects will be occurring at the same time spread across multiple sites throughout the state. In addition to managing projects, there is the planning needed to identify the projects and the coordination of all of it within the program. FWP will utilize a variety of resources in addition to its own staff to effectively manage the program and projects including private contractors, cooperative agreements with other agencies, agreements with other organizations (such as universities or non-profits), and volunteers.

4.2 Prioritizing Areas for Property-Specific Forest Management Plans

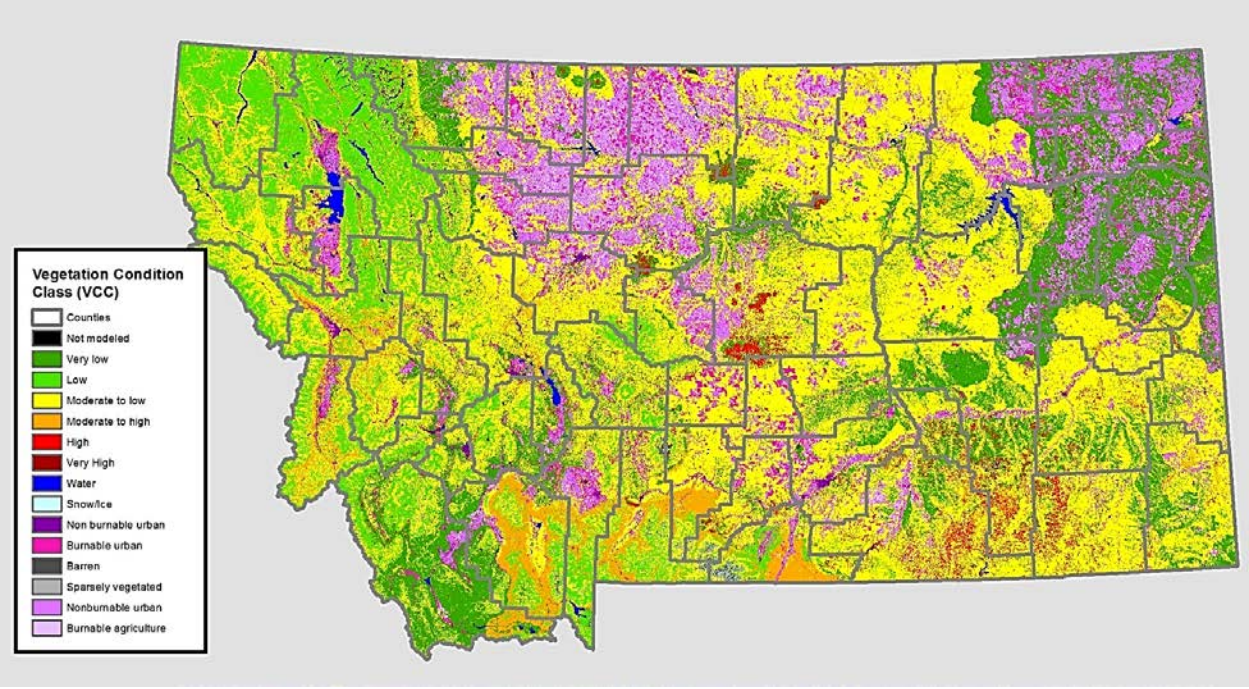
In order to prioritize areas for implementing the FWP Forest Management Plan, managers should systematically evaluate needs across the program so that limited management resources are targeting

areas with the greatest needs. Several organizations have conducted assessments of forest and habitat conditions across the state, regionally, and nationally. Based on FWP's objectives for its various Divisions' properties and statutory forest management obligations, the following resource assessments can be helpful in determining priority areas to "…*address fire mitigation, pine beetle infestation, and wildlife habitat enhancement*…":

Vegetation Condition Class (LANDFIRE 2014) – Vegetation Condition Class (VCC) represents a simple categorization of the associated Vegetation Departure (VDEP) layer and indicates the general level to which current vegetation is different from the simulated historical vegetation reference conditions. Factors used to develop VCC include LANDFIRE mapped current conditions (e.g. succession class), estimated reference conditions, land types (such as natural vegetation, burnable ag, and/or burnable urban), and landscape summary units (such as ECOMAP Subsections and/or Hydrological Units). VDEP is based only on departure of current vegetation conditions from reference vegetation conditions, and not departure of current fire regimes from those of the reference period.

The VCC ratings (very low, low, moderate to low, moderate to high, high, and very high) can be useful in evaluating one of the components of ecological integrity described in the FWP Forest Management Plan and therefore can be one useful factor in prioritizing forest management needs.

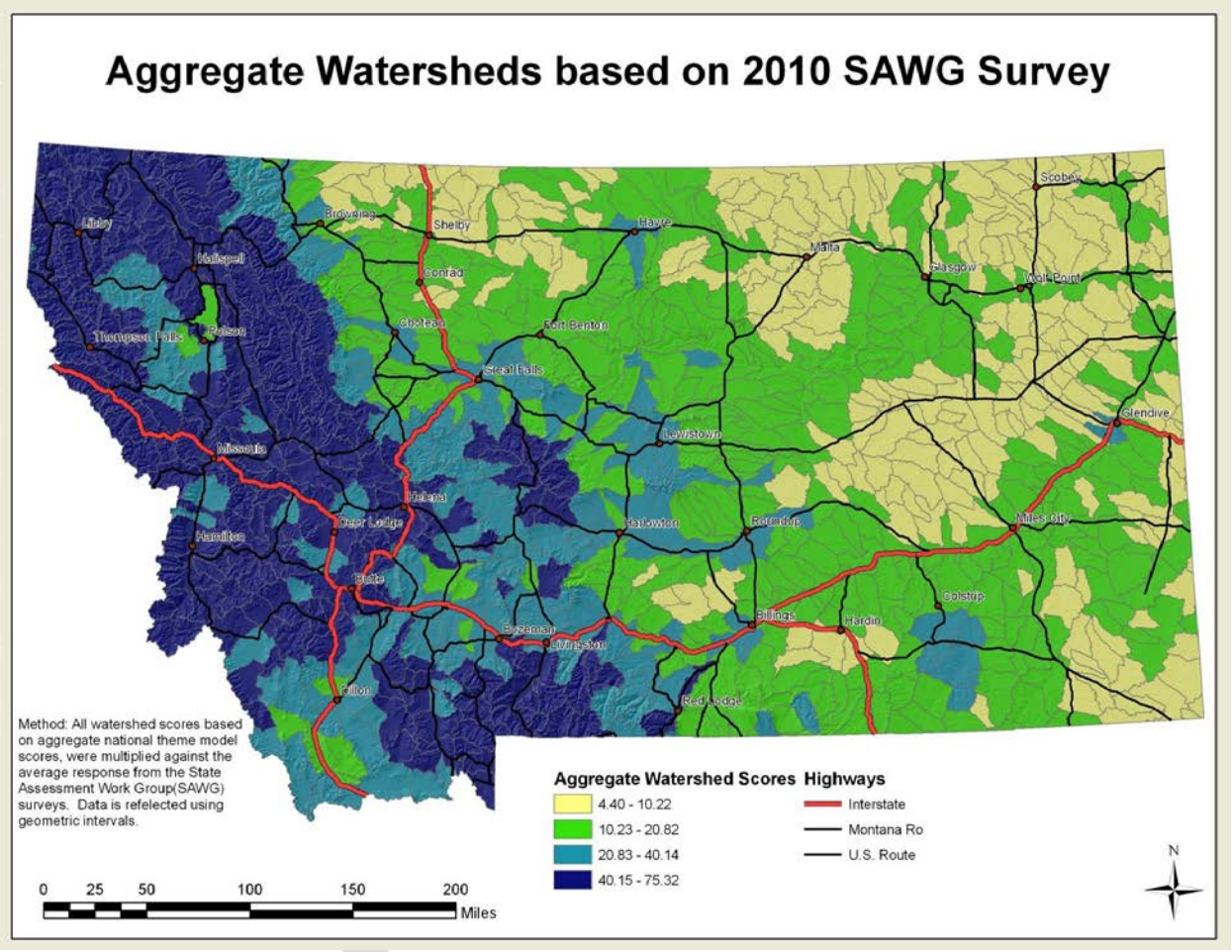
Figure 24 - Vegetation Condition Class (LANDFIRE 2014)



DNRC Assessment of Forest Resources Critical Landscapes (DNRC 2010) – The Montana Department of Natural Resource and Conservation (DNRC) conducted a Statewide Assessment of Forest Resources (SAFR). This was accomplished using geographic information system (GIS) analytic techniques. It involved developing 11 separate sub-model layers based on the National State Assessment Guidance. The project began in January 2009 and ended in January 2010, with recommendation by the Montana

Statewide Assessment Working Group (SAWG) and approval by the State Forester. The SAWG was made up of over 40 stakeholders representing all forest ownership types and several forest interests from around the state. “Critical landscapes” in Montana are defined as watersheds that meet a pre-defined set of variables linked directly to a 2008 Farm Bill Federal Redesign objective and subsequent Farm Bill program authority. It is an area prioritized for direct delivery of State & Private Forestry Programs.

Figure 25 - DNRC Assessment of Forest Resources Critical Landscapes (DNRC 2010)

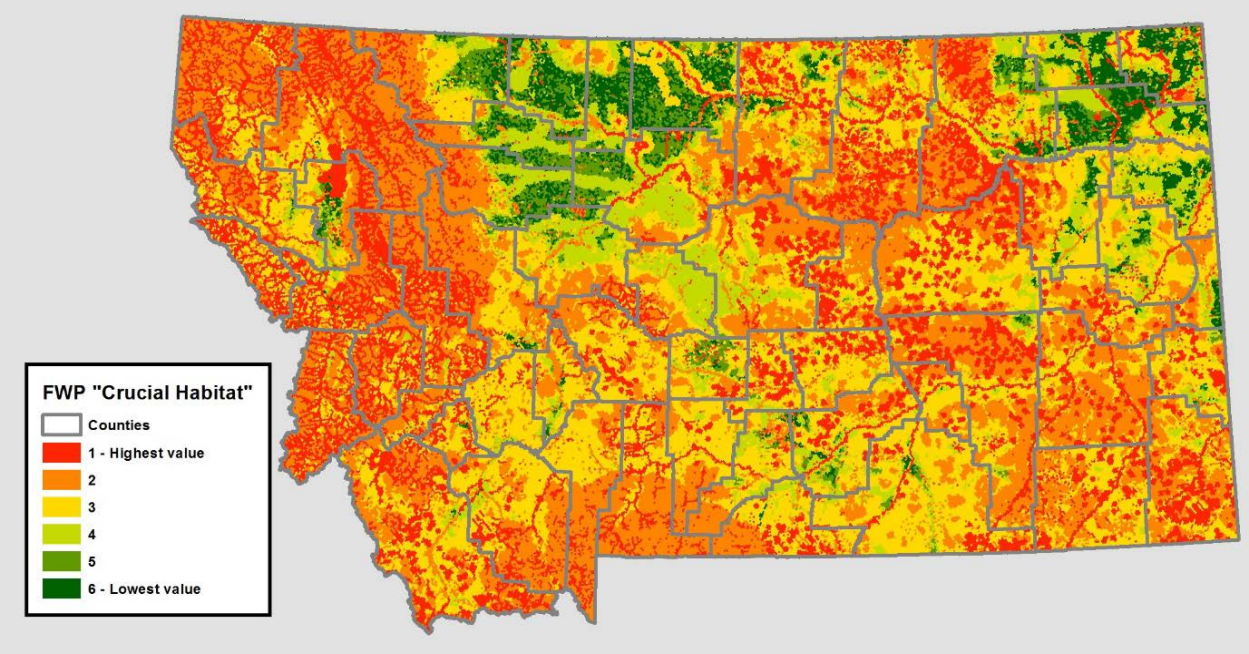


Areas identified in the SAFR continue to be priority landscapes for implementing a variety of DNRC and federal programs. They were also developed based on several data sources of interest to FWP such as insects and disease susceptibility, stand replacement fire risk, and threatened fish and wildlife habitat. Therefore, these “Critical Landscapes” can be a factor for prioritizing forest management needs.

FWP Crucial Area Planning System Crucial Habitat Rank (FWP 2015b) - In 2008, as a part of a Western Governor's Association initiative, Montana Fish, Wildlife & Parks took the lead in conducting a statewide Crucial Areas Assessment. The Assessment evaluated the fish, wildlife and recreational resources of Montana in order to identify crucial areas and fish and wildlife corridors. The Assessment is part of a larger conservation effort that recognizes the importance of landscape scale management of species and habitats by fish and wildlife agencies. "Crucial habitat" is defined as places containing the resources (including food, water, cover, shelter and important wildlife corridors) that are necessary for the survival and reproduction of aquatic and terrestrial wildlife and to prevent unacceptable declines, or facilitate future recovery of, wildlife populations; or are important ecological systems with high biological diversity value. The compiled Crucial Habitat Rank layer can be used to determine areas containing high priority crucial habitats. This layer is a result of aggregating all crucial habitat input layers (such as habitat for species of concern, large natural areas, landscape connectivity, species of economic and recreational importance, wetland and riparian areas, aquatic connectivity, fish native species richness, game fish life history, large landscape blocks and habitat connectivity, and watershed integrity) and can provide an initial overview of whether an area contains crucial habitat or important natural resources for fish and wildlife.

These important fish and wildlife habitats are clearly a driving factor in prioritizing forest management needs.

Figure 26 - FWP Crucial Area Planning System Crucial Habitat Rank (FWP 2015b)

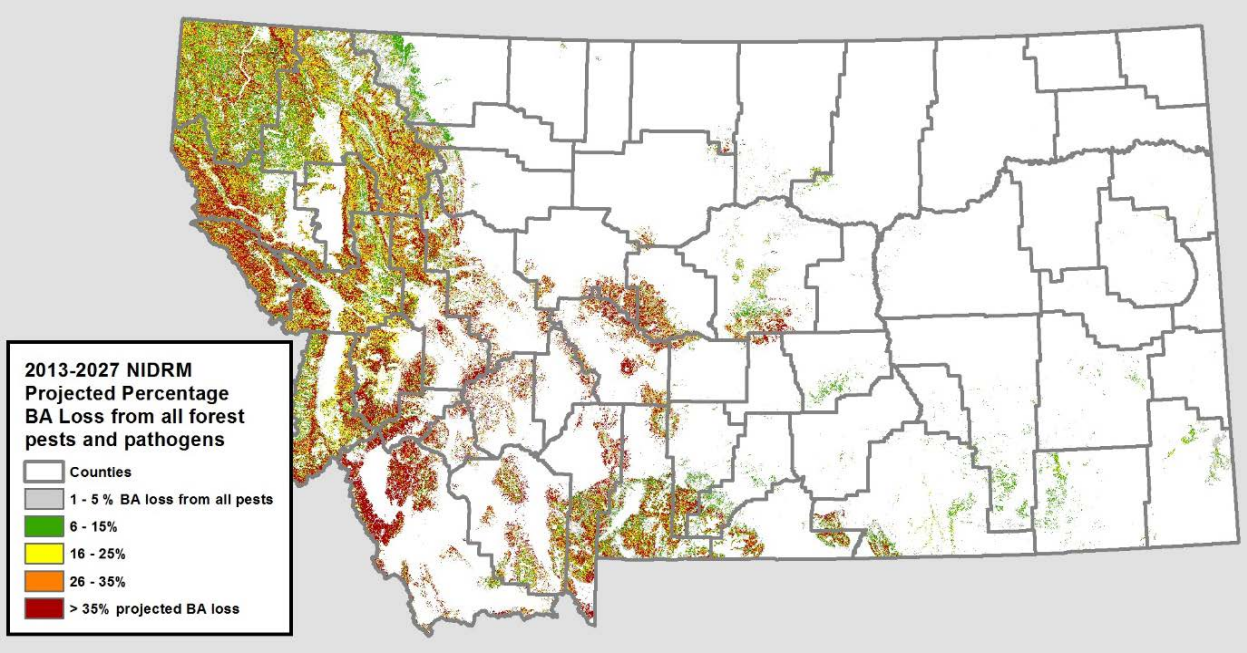


2013-2027 National Insect and Disease Forest Risk Assessment (Kirst et al. 2014) – The National Insect and Disease Risk Map (NIDRM) represents 186 individual insect and disease hazard models, integrated within a common GIS-based, multi-criteria framework, that can account for regional variations in forest health. Risk, or more appropriately termed hazard, is defined as the expectation that, without remediation, at least 25% of standing live basal area greater than one inch in diameter will die over a 15-

year time frame (2013 to 2027) due to insects and diseases. This risk assessment also includes a dataset projecting the percentage loss of total basal area (BA) from all pests and pathogens, as shown in Figure 5 below.

Addressing "pine beetle infestation" is a statutorily mandated objective in legislation that guides FWP's forest management program. Other insect and pathogen hazards are also important factors in prioritizing forest management needs.

Figure 27 - 2013-2027 National Insect and Disease Forest Risk Assessment (Kirst et al. 2014)



Other ranking criteria

- Susceptibility to uncharacteristic stand-replacement fire
- Successional processes causing deterioration of primary habitat functions (e.g., snow intercept; grass or shrub forage; loss of aspen or riparian characteristics)
- Occurrence, extent, and potential for expansion of uncharacteristic disease/insect occurrence
- Occurrence or predicted occurrence of certain priority species (fine filter)
- Public safety concerns
- Loss of value that may otherwise help fund an appropriate treatment (i.e. salvage or sanitation)
- WUI fire hazard
- Natural resource threats (e.g., soil, water) due to successional trajectory

Combining these factors into a decision matrix could provide a relative comparison of forest management priorities across the state. Using GIS, a new dataset could be created containing a relative ranking of forest management priorities and it could be intersected with FWP's forested lands GIS layer to identify which properties rank as the highest priorities for forest management. This can be a useful

guide to help managers determine which FWP sites could be prioritized for developing property-specific forest management plan and projects.

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GLOSSARY

Big game: Large animals sought or taken by hunting, especially for sport, including elk, bighorn sheep, bison, black bear, mountain lion, White-tailed deer, mule deer, antelope, mountain goat, and moose.

Biodiversity: The genes, organisms, populations, and species of an area, and the ecosystem processes supporting them.

Climax: the [theoretical] culminating stage of plant succession for a given environment; the vegetation conceived as having reached a highly stable condition.

Coarse filter approach: Conserving species diversity by providing adequate representation (distribution and abundance) of ecological land units considering the historic range of variability based upon an understanding of the natural disturbance regimes of the ecological land units.

Desired future condition: Describes what the forest should be like after implementation of the management direction contained in the plan.

Disturbance: Any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.

Ecological integrity: the ability of an area to support biodiversity and the ecosystem processes necessary to sustain biodiversity over the long term.

Ecological setting: A term coined by FWP specifically for forest management as a term of convenience to categorize and communicate the variety of wildlife habitat functions that occur on Montana's Wildlife Management Areas

Fine filter approach: Conserving individual species that are assumed to be inadequately protected by the coarse and/or mesofilter approaches.

Furbearers: In Montana, furbearing animals are legally defined as beaver, otter, muskrat, mink, marten, fisher, wolverine, bobcat, swift fox, and lynx.

Future range of variability (FRV): The estimated range of ecological structures and processes that may occur in the future based on predicted future climates.

Habitat: The set of resources and conditions that allows for the occupancy, survival and reproduction (or fitness) of an organism in a given area.

Habitat type: All land areas potentially capable of producing similar plant communities at climax.

Historic range of variability (HRV): The range of variation of ecological structures and processes during the historic reference period.

Mesofilter approach: Conserving key habitat elements that are important to species but too fine to address through the coarse filter approach, so that many species will be protected without needing to consider them individually.

Reference conditions: the range of historic (or natural) variability in ecological structures and processes, reflecting recent evolutionary history and the dynamic interplay of biotic and abiotic conditions and disturbance patterns.

Stumpage: The estimated or actual amount that buyers would be willing to pay for standing timber for immediate harvesting, expressed as a dollar per unit measure (e.g. $/MBF or $/ton)

Succession: The gradual supplanting of one community of plants by another.

Successional class: A characterization of current vegetation conditions with respect to the vegetation species composition, canopy position, cover, and height ranges occurring within a vegetation community.

APPENDIX A – PROPERTY-SPECIFIC FOREST MANAGEMENT PLAN AND PROJECT APPROVAL PROCESS

This appendix outlines the internal process for proposing and approving projects. It does not provide purchasing/contracting processes. Contracts for services will be subject to all applicable state purchasing and procurement laws and rules.

Property-specific forest management plans

The purpose of a property-specific forest management plan is to evaluate current conditions, develop desired future conditions (DFC), determine actions that can be implemented to achieve DFCs, and monitoring that will be done to track progress towards achieving DFCs at individual FWP sites using the guidance and direction provided in this FWP Forest Management Plan. Property-specific forest management plans will identify opportunities, priorities, and timelines for forest management projects. Ideally, these will become an appendix to the FWP site's management plan. Both this FWP Forest Management Plan and individual FWP site management plans will undergo public review and Commission and/or Board approval. Since property-specific forest management plans would tier to the guidance in the FWP Forest Management Plan to achieve objectives identified in FWP site management plans, they would not undergo further public review and Commission and/or Board approval.

Forest Management Projects

Project opportunities would be identified in property-specific forest management plans. Based on these plans, FWP managers would identify two-year and five-year project lists, budgets, and prioritize implementation based on need and funding availability. The five-year project list and budget would be used to forecast future budget needs and the two-year project list would be used to prepare operations and capital budgets for legislative authority for the biennium (e.g. the 2017 legislature approves spending authority for fiscal years 2018 and 2019). These project lists and budgets would ensure the program remains financially sustainable.

Depending on the type of project, there are different internal project approval processes:

Projects Involving the Sale or Disposal of Timber with Commercial Value

1. Prepare a Commission or Board cover sheet, justification, and a map showing potential treatment areas for endorsement to proceed.
2. If approved, prepare an environmental assessment and solicit public involvement in accordance with MEPA requirements.
3. Prepare the final environmental assessment, decision notice, and cover sheet for Commission or Board final approval.
4. If approved; project layout, design, appraisal, and other applicable preparations would be completed and bid prospectuses would be prepared for contracted services.

Projects Not Involving the Sale or Disposal of Timber with Commercial Value

1. Prepare an environmental assessment and solicit public involvement in accordance with MEPA requirements.
2. Prepare final environmental assessment and decision notice.
3. Upon completion of MEPA process; project layout, design, appraisal, and other applicable preparations would be completed and bid prospectuses would be prepared for contracted services.

APPENDIX B – FOREST MANAGEMENT PLAN CHECKLIST

This forest management plan checklist is designed to ensure property-specific forest management plans and projects are implemented in accordance with the direction and guidance in the FWP Forest Management Plan.

FWP FOREST MANAGEMENT PLAN CHECKLIST

Instructions

The FWP site manager, or their designee, will fill out a forest management plan checklist for qualifying forest management activities (see list). This checklist is not required for sites with less than 50 contiguous acres of forested land or for administrative activities, but may be filled out at the manager's discretion. Upon completion, this checklist will be attached to property-specific forest management plans or stored in project files prior to implementing forest management activities.

General information

FWP Site Name(s): Click or tap here to enter text.

Project Name (if applicable): Click or tap here to enter text.

FWP Region: Click or tap here to enter text.

Preparer Name: Click or tap here to enter text. **Date:** Click or tap here to enter text.

Qualifying Forest Management Activities (check all that apply)

- ☐ Property-specific forest management plan
- ☐ Mechanical – Timber harvest (commercial)
- ☐ Mechanical – Non-commercial tree removal
- ☐ Mechanical – Grinding/mastication
- ☐ Mechanical – Site preparation
- ☐ Mechanical – Slash piling/disposal
- ☐ Mechanical – Other (specify:_____)
- ☐ Non-mechanical – Reforestation
- ☐ Non-mechanical – Fertilization
- ☐ Non- mechanical – Herbicide
- ☐ Non- mechanical – Hand cutting
- ☐ Non-mechanical – Girdling
- ☐ Non-mechanical – Prescribed burning
- ☐ Non-mechanical – Other (specify:_____)

Checklist and Rationale

Not all activities must be marked yes in the "Complied" box. Provide rationale regardless of answer to "Complied" question.

Forest Management Plan Directive	Complied (Yes, No, or N/A)	Rationale
Pursued cooperative management		
Conducted coarse filter analysis		
Coarse filter DFCs identified		
Conducted mesofilter analysis		
Mesofilter DFCs identified		
Conducted fine filter analysis		
Fine filter DFCs identified		
Special Management Areas identified		
Special Management Area DFCs identified		
Forest Inventory completed		

Forest Management Plan Directive	Complied (Yes, No, or N/A)	Rationale
Silvicultural prescriptions completed		
Silvicultural system appropriate for achieving DFC		
Potential for commercial timber harvest evaluated		
Standards and guidelines developed for treatments		
Monitoring plan developed		

APPENDIX C - STANDARDS AND GUIDELINES FOR IMPLEMENTING FOREST MANAGEMENT ACTIVITIES

Activities that may be implemented to achieve DFCs on FWP forested lands have the potential to adversely impact other resources. The following standards and guidelines were developed to mitigate and/or minimize effects on other resources when conducting forest management activities. Sections are organized by activity type and by resource that could be impacted. They are also ordered by activities with the least potential to impact resources (administrative) to the activities that are could to have a greater impact to resources (mechanical treatments).

Administrative activities

Administrative activities are managerial activities that are performed by FWP staff or by contractors hired to perform such activities. These activities commonly include field visits, inventory data collection, field reconnaissance, surveying, project layout and design, monitoring, and contract administration.

Noxious weed management

- Field staff would be able identify Category 1-4 noxious weeds listed in the FWP Statewide Integrated Noxious Weed Management Plan and coordinate with the appropriate FWP site manager to ensure they have been accounted for in the site's integrated noxious weed management plan.
- Pickups and other support vehicles would be washed regularly, especially when they have been in other areas infested with noxious weeds.
- Field staff would inspect and clean field equipment to avoid spreading noxious weed seeds to and from other sites.

Roads

- Avoid vehicle travel when road beds are soft. Rutting can cause drainage features to become non-functional leading to sediment delivery and erosion.

Wildlife

- Activities would be planned so that they minimize disturbance to priority wildlife species that are sensitive to human activity.
- When the purpose of public closures to FWP sites is for wildlife security, minimize the intensity and duration of activities occurring within the public closure period to the extent practicable. Consult the area wildlife biologist to plan operating periods for activities that would impact wildlife.
- If a threatened, endangered, or sensitive species of concern are encountered, consult the Area Wildlife Biologist and develop additional mitigations.

- Store human or pet food, livestock food, garbage, and other attractants in a bear-resistant manner.
- Do not bury or discard attractants on the FWP property, or burn attractants (such as food leftovers) in an open campfire.
- Public access would be restricted at all times on restricted roads that are opened for forest management activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).
- Minimize potential disturbance to grizzly bears during the spring period by restricting activities in spring habitat.
- The area wildlife biologist would identify additional mitigations for site specific wildlife considerations.

Cultural resources and archaeology

- Do not tamper with or take artifacts from cultural/historic sites.
- If previously unknown cultural resources are discovered, notify the State Historic Preservation Office (SHPO).

Public use

- "Shed hunting" or collecting shed antlers or horns from big-game animals is not allowed by contractors or staff because it takes away from public use opportunities.
- If forest management activities conflict with public use opportunities, the activities would be advertised and communicated to the public (such as through signage or media) and such activities would be planned and conducted in a manner to minimize public conflicts.

Aesthetics

- In campgrounds and developed public-use areas, use cut-tree marking for painting trees to cut when possible. If leave-tree marking, use flagging and remove and dispose after treatment or if painted, repaint trees with brown (or camo) paint after treatment has been completed.

Non-mechanical treatments

Non-mechanical treatments are treatments not requiring heavy equipment and involve activities that manipulate forest vegetation. These activities may be implemented by FWP staff or contractors. They commonly include reforestation, herbicide application, hand cutting, prescribed burning (and burning related activities), and grass seeding. **Mitigations previously listed are not repeated so the mitigations for non-mechanical treatments are in addition to those previously listed.**

Sensitive Plants

- Sensitive plants would be identified using the Montana Natural Heritage Program (MNHP) database and appropriate mitigations would be developed to avoid displacing sensitive plants.

- If sensitive plant populations are found, the appropriate habitat area will be excluded from the treatment until the appropriate mitigations are developed.
- Many sensitive plants are associated with riparian areas, wetlands, springs, or other localized features. These features would be identified on project maps and site-specific mitigations would be developed depending on the proposed treatment.
- Herbicides would be applied by licensed applicators in accordance with applicable laws, rules, and regulations.

Noxious weed management

- Herbicides would be applied by trained/licensed applicators in accordance with applicable laws, rules, and regulations.
- Treatment of weeds prior to forest management activities may be required to prevent establishment and spread.
- When broadcast burning, seeding with an approved grass mix may be required if pre-burn native vegetation cover is sparse and/or pre-burn noxious weed cover is expansive.
- When piling and burning, reseeding with an approved grass mix may be necessary to prevent establishment and spread of weeds.

Native vegetation

- Herbicides would be applied by trained/licensed applicators in accordance with applicable laws, rules, and regulations.
- When broadcast burning, burn plans shall address fuel moisture, soil moisture, season (time of year), humidity, temperature, firing techniques and ignition methods, and other factors that will promote post-fire survival and enhance rate of recovery of native vegetation.
- When piling and burning, the following should be considered:
    - Materials greater than 3 inches should not be piled
    - Piles should be clean (free of dirt) and compact to ensure easy ignition and complete consumption
    - To reduce burn severity, piles should be less than 8 ft x 8 ft x 8 ft
    - If possible, piles should be built on skid trails, already disturbed areas, or in areas where the least amount of damage to native vegetation would be incurred
    - Conduct pile burning during seasons and under conditions when fires will not spread and fires will go out after fuel in the pile is consumed
    - Part of the pile may need to be covered to ensure ignition and consumption
- Consider jackpot burning slash accumulations instead of piling if it would minimize impacts native vegetation, and if containment and escape concerns can be addressed.

Wildlife

- When security and visual screening is applicable, use a combination of topography, group retention, and roadside vegetation along open roads to reduce sight distances.

Air quality

- To prevent individual or cumulative effects and provide for burning during acceptable ventilation and dispersion conditions during burning operations, burning will be done in compliance with state and county burning season and permitting requirements.
- Burn piles will be clean (free of dirt) to allow easy ignition during fall and spring when ventilation is good and surrounding fuels are wet.
- Allow enough time for fuels to dry out (cure) before burning and avoid burning "green" piles.
- Burn piles may need to be covered to keep piles dry and allow the piles to ignite more easily, burn hotter, reduce dispersed smoke, and extinguish more quickly.
- The number and size of piles to burn will be reduced by minimizing the amount of material larger than 3 inches in piles.

Aesthetics

- Within campsites or developed public areas, stumps would be cut to ground height.

Public use

- Within campsites or developed public use areas, activities that would negatively impact public use (including but not limited to chainsaw or mechanized cutting, burning, chipping, or herbicide application) would be conducted during the off-season (October to April) unless these concerns can be mitigated through temporary closure or by other means.

Mechanical Treatments

Mechanical treatments are treatments requiring heavy equipment that manipulate forest vegetation and activities associated with these treatments, such as road construction. These activities may be implemented by FWP staff or contractors. They commonly include timber harvest (logging), grinding, mastication, mechanical precommercial thinning, site preparation, machine piling and slash disposal, and other mechanical treatments. FWP forest management activities would comply with all current and applicable forest practices laws and BMPs. **Mitigations previously listed are not repeated so the mitigations for mechanical treatments are in addition to those previously listed.**

Noxious weed Management

- All tracked and wheeled equipment will be cleaned of noxious weeds prior to entering the FWP property and beginning project operations.
- Disturbed roadside sites will be promptly reseeded using appropriate timing and with an approved grass mix.
- Herbicide application; applied by trained/licensed applicators in accordance with applicable laws, rules, and regulations; may be used to control weeds.
- When creating large roadside landing slash piles, remove and stockpile topsoil so it can be spread over the burned area and reseeded with an approved grass mix.

Native vegetation

- Winter logging, when ground is sufficiently covered with snow, would be used to protect desirable native vegetation (such as bunchgrasses) from being displaced.
    - If winter logging is not possible, restricting logging to periods when plants are dormant (late summer/fall) would be acceptable, but mitigations such as using a forwarder (full log suspension) and operating equipment on a slash mat, should be considered.
- Mechanical scarification would not be used in stands where significant coverage of desirable native vegetation (such as bunchgrasses) would be displaced.
- Plan skid trails to the minimize impacts to desirable native vegetation
- When implementing treatments to reduce conifer expansion in grasslands and shrublands, minimize the amount of slash retained by either whole-tree yarding, girdling, and/or piling and burning. Slash may decompose slowly on these sites and in the event of a wildfire the increased fuel load can result in higher-than-normal fire intensity and slower recovery of desirable native vegetation.

Watershed and fisheries

- Planned erosion-control measures and BMPs include installing grade breaks on roads, installing water-diverting mechanisms on roads, installing slash-filter windrows, and grass seeding.
- All road stream crossings will be monitored for sedimentation and the deterioration of the road prism.
- Equipment traffic will only be allowed where road stream crossings have adequate load-bearing capacity.
- Consult the Area Fisheries Biologist for projects requiring stream crossing construction, replacement, or removal.
- New road stream crossing structures will ensure fish passage in fish streams.
- The contractor will be responsible for the immediate cleanup of any spills that may affect water quality (fuel, oil, dirt, etc.).
- Equipment would be inspected for leaking fluids prior to entering FWP property and throughout the operation. Leaking equipment will not be permitted to operate on FWP property and will be promptly repaired if leaks occur during the operation. It will be the responsibility of the contractor and his or her equipment operators to comply with clean-up and reporting required by applicable state and federal laws.

Wildlife

- Roads and skid trails that are opened as a result of mechanical treatments would be reclosed to reduce the potential for unauthorized motor vehicle use.

Soils

- Logging equipment will not operate off forest roads unless:
    - soil moisture is less than 20 percent,

    - soil is frozen to a depth of 4 inches or a depth that will support machine operations (whichever is greater), or
    - soil is snow covered to a depth of 18 inches (loose) or 12 inches (packed).
- Existing skid trails and landings will be used when their design is consistent with prescribed treatments and current BMP guidelines are met.
- The contractor and State representative will agree to a skidding plan prior to operating equipment.
- To reduce the number of skid trails and the potential for erosion, designated skid trails will be required where moist soils or short steep pitches (less than 300 feet) will not allow access by other logging systems.
- The density of skid trails in a harvest area will not exceed 20 percent of the total area in the cutting unit.
- Ground-based logging equipment (tractors, skidders, and mechanical harvesters) is limited to slopes less than 45 percent on ridges, convex slopes; and to 40 percent or less on concave slopes without winter conditions.
- Ground skidding machinery will be equipped with a winchline to limit equipment operation on steeper slopes.
- Roads used by contractors will be reshaped and the ditches redefined to reduce surface erosion prior to and following use.
- Drain dips, open-topped culverts, and gravel will be installed on roads as needed to improve road drainage and reduce erosion and maintenance needs.
- Some road sections will be repaired to upgrade the roads to design standards that will reduce the potential for erosion and maintenance needs.
- Certified weed-free grass seed and fertilizer will be applied promptly to newly constructed road surfaces, cutslopes, and fillslopes. These applications will also be done on existing disturbed cutslopes, fillslopes, and landings immediately adjacent to open roads. These applications, which will stabilize soils and reduce or prevent the establishment of noxious weeds, would include:
    - seeding all road cuts and fills concurrently with construction,
    - applying 'quick cover' seed mix within 1 day of work completion at culvert installation sites, and
    - seeding all road surfaces and reseeding culvert installation sites when the final blading is completed for each specified road segment.
- Based on ground and weather conditions and as directed by the State representative, water bars, logging-slash barriers, and, in some cases, temporary culverts will be installed on skid trails where erosion is anticipated. These erosion-control features would be periodically inspected and maintained throughout the operating period.

<u>Air quality</u>

- Depending on the season of harvest and level of public traffic, dust abatement may be applied on some segments of the roads that will be used during hauling.

Aesthetics

- Damaged submerchantable residual vegetation along open roads or visually sensitive areas would be slashed.
- Landings will be limited in size and number and located away from main roads when possible.
- Disturbed sites directly adjacent to roads will be grass seeded.
- When possible, healthy trees not big enough to harvest will be retained.
- When possible, techniques such as feathering, which involves marking additional timber along the harvest boundary lines, or rounding, which involves eliminating abrupt edges such as those found at property corners, will be implemented to reduce the appearance of straight boundary lines along harvest units.

Cultural resources and archaeology

- Consult the State Historic Preservation Office (SHPO) for a records review for projects that have the potential for ground disturbance.
- SHPO will determine if a cultural resource inventory is warranted when projects involve implementing severe ground disturbing activities (such as excavating skid trails or new road construction).
- A contract clause shall be included in contracts that provides for suspending operations if cultural resources are discovered, and only resuming operations when directed by the State.

Roads

- Road planning would be coordinated with the need for public access and administrative needs for the FWP forested property.
- As stated in BMPs, road development for facilitating timber harvest operations would be minimized. Some additional considerations to minimize road development include:
    - Use existing roads when their design is consistent with prescribed treatments and current BMP guidelines are met
    - Harvest productivity (such as basing the road spacing on reducing skidding distances and increasing logging production) would not be a primary consideration in road planning.
    - Using alternative harvesting systems such as skyline, downhill yarding, excaline yarding, or helicopter yarding
    - When new construction is needed, consider using temporary roads that would be closed after operations are completed
    - Construct and maintain roads to the minimum standard necessary to meet BMPs, facilitate timber harvest and log hauling, and for public access
- When decommissioning roads, consider leaving a portion of the road prism open for walk-in access
- Information about road reconstruction activities and road use associated with road construction activities will be relayed to the public.
- Signs will be placed on restricted roads to prohibit public access while harvesting operations are in progress; these roads will be physically restricted during inactive periods (nights, weekends, holidays, shutdowns).

Infrastructure and facilities

- Infrastructure and facilities such as gates, signs, telephone lines, power lines, fences, irrigation ditches, cattle guards, drainage structures, bridges, trails, campgrounds, toilets, or any other improvements that have the potential to be damaged by mechanical treatments and associated activities would be identified and if needed, clearly marked on the ground.
- Site specific mitigation measures would be developed to protect infrastructure and facilities
- Expenses associated with the repair or replacement of damaged infrastructure or facilities caused by a contractor, their employee(s), or subcontractors would be the sole responsibility of the contractor
- In campsite and other high public use areas, activities would be conducted during the off-season